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Abstract
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William Bartram's early observation of a nest association between cyprinid fishes. By Philip A. Cochran.

Keywords
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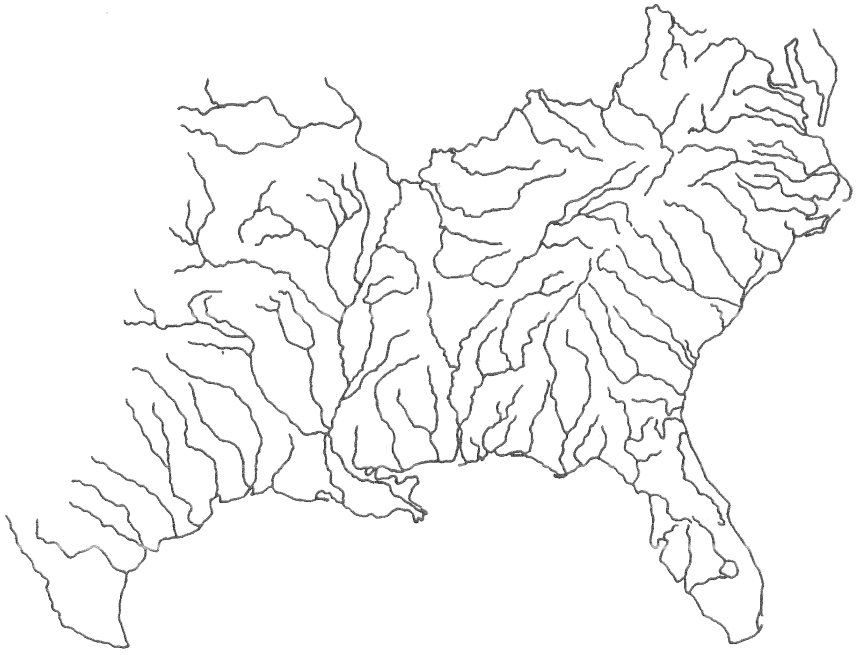

Contents

Survey of Fishes in the Southern Tributaries of the South Bend of the Tennessee River with Notes on Wheeler, Wilson, and Pickwick Reservoirs

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ABSTRACT

Fishes were recorded from 183 historic and new localities from southern tributaries of the south bend of the Tennessee River in Morgan, Lawrence, and Colbert counties, Alabama. The major tributaries include Cane, Little Bear, Spring, Town, Big Nance, Flint, and Cotaco creeks. A total of 100 species and three hybrids representing 20 families were found in the study area. Eleven species not previously documented from this area include *Amia calva, Cyprinella venusta, Hybopsis amblops, Notropis boops, Noturus nocturnus, Fundulus catenatus, Lepomis auritus, Etheostoma blennioides, E. kennicotti, E. nigrum*, and *Perca flavescens*. This study documents temporal changes in the ichthyofauna of the study area, as well as present faunal differences between tributaries in the study area and tributaries in the Tennessee River drainage outside the study area. It also provides evidence for dramatic loss of biodiversity within the study area correlated with agricultural and industrial activities.

INTRODUCTION

The Tennessee River represents one of the most complex and diverse river systems in North America. A total of 250 species and/or subspecies of fishes are found within the Tennessee and Cumberland rivers (Etnier and Starnes, 1993). The Tennessee River drains 105,000 km^2 lying in portions of Virginia, North Carolina, Tennessee, Georgia, Mississippi, Kentucky, and Alabama. Although the majority of this drainage is in Tennessee, it flows southwest into northeastern Alabama and northwest across much of north Alabama and northeastern Mississippi before returning north into Tennessee. The area of the river in northern Alabama is known as the southern bend of the Tennessee River.

Early ichthyological works on this area were conducted by several investigators (Jordan, 1877; Gilbert, 1891; Kuhne, 1939), but these were general and included few samples. Later investigators focused on particular tributaries (Wall, 1968; Jandebeur, 1972) and springs (Armstrong, 1969) in this region, but included more detailed sampling. In addition general collections by H.T. Boschung and students at the University of Alabama added to our knowledge of the distributions of fishes in this area. To date considerable work has been done in the southern bend of the Tennessee River to document the fauna, except for a large expanse on the southern side in Colbert, Lawrence, and Morgan counties.

The purpose of this study was to conduct qualitative samplings of fishes from this generally ignored region. These data, together with historical collections, are summarized to present a complete inventory of the fish species and their distributions in the region.

STUDY AREA

The southern tributaries of the southern bend of the Tennessee River are located in all of Colbert, Lawrence, and Morgan counties and parts of Franklin, Cullman, and Marshall counties, Alabama (Fig. 1). From west to east the main tributaries include: Cane, Little Bear (different from the tributary of the Bear Creek watershed), Spring, Town, Big Nance, Spring, Mallard, Fox, Flint, and Cotaco creeks. The entire area encompasses about 3,058 km^2. It is an area of mixed hardwood forests and small to large farms, many of which are located along the Tennessee River on prime farmland. Cotton, wheat, corn, hay, and soybeans are important crops throughout the area. In Lawrence County the major land use varies between crop land (42%), forest (35%), and pasture (19%). In Morgan, forest (47%) makes up the majority of land use types followed by pasture (28%) and crop land (20%) (Cox, 1990).

Physiography

The majority of the survey area lies within the southern part of the Highland Rim (Interior Low Plateaus) physiographic province. It is bordered by the Cumberland Plateau at the extreme southern edge in which the headwaters of a few of the larger tributaries are located. The western edge of the survey is bordered by the Coastal Plain, but none of the tributaries are located within this province. Descriptions of the Highland Rim province and its component districts are based in part on several investigations (Johnston, 1930, 1933; McCalley, 1896; Luther, 1977) and a physiographic region map of Alabama (Sapp and Emplaincourt, 1975).

The Highland Rim is a giant crater-like structure that extends from central Tennessee south into northern Alabama. This area is composed primarily of limestones, chert, and some shales. The southern portion of this province is particularly rich in cave and spring habitats due to its limestone composition. The Highland Rim, south of the Tennessee River, may be divided into three districts: Tennessee Valley (TV), Moulton Valley (MOV), and Little Mountain (LIM) (Fig. 2). All tributaries, with the exception of Cane and Little Bear creeks, flow through all three physiographic districts. Cane and Little Bear creeks only flow through LIM and TV.

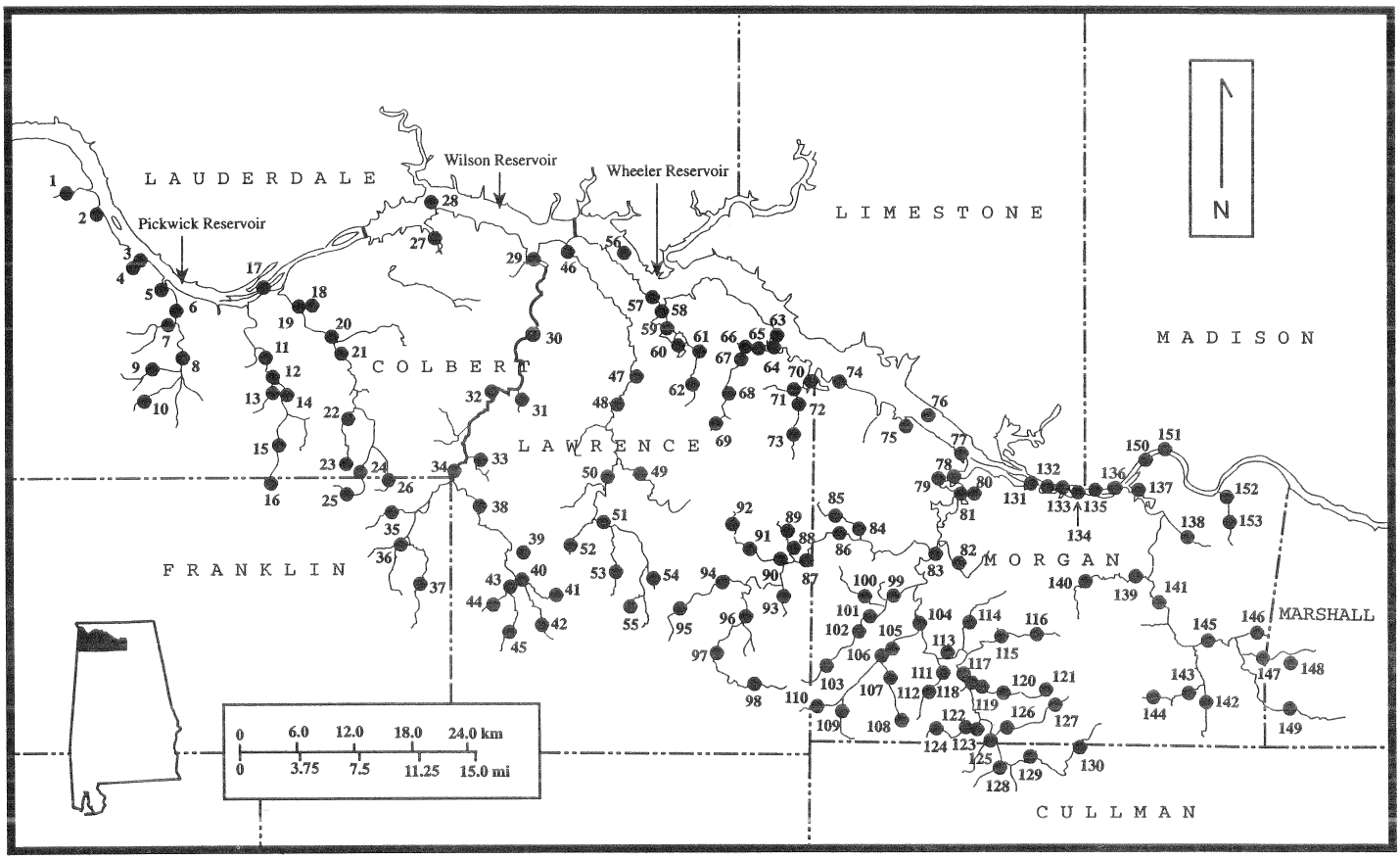


Figure 1. Historic and new localities sampled for the southern tributaries of the south bend of the Tennessee River.

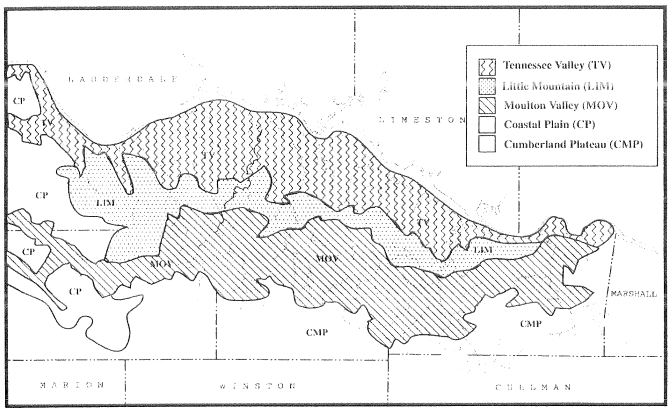


Figure 2. Physiography of the study area includes the Coastal Plain (CP), Cumberland Plateau (CMP), and the Highland Rim provinces, the latter of which may be divided into Tennessee Valley (TV), Little Mountain (LIM), and Moulton Valley (MOV), districts.

The TV occupies an area 144.9 km long from east to west and 32.2 to 64.4 km north to south and includes Lauderdale and Limestone counties and parts of Madison, Colbert, Lawrence, and Morgan counties. It is a rolling upland with a maximum relief of about 122 m. Its average altitude in Alabama is about 183 m. In Colbert, Lawrence, and Morgan counties, sinkholes interrupting the surface drainage mark the outcrop of the Warsaw limestone. Here the drainage is to a large degree subterranean, and sinks and springs are common.

LIM, which extends for 96.6 km from east to west across Colbert, Lawrence, and Morgan counties, is a narrow outlying remnant of the Cumberland Plateau developed upon the southward-dipping monoclinal beds of Hartselle sandstone from which the overlying Bangor limestone has been stripped by erosion. It ranges from 12.9 to 16.1 km in width. It is best developed in Colbert County, where its surface, along the northern escarpment, attains an altitude of 244 m and slopes southward to about 183 m on the edge of MOV. The interstream areas, though generally rounded, preserve scattered tracts of flat plateau-like uplands to the south, and have wide valleys developed upon the Bangor limestone in the MOV district. In the LIM, the interstream areas cut through narrow valleys deeply incised in the sandstone beds. To the east the topographic unity of LIM becomes less marked, and the district ends just west of the Morgan-Marshall county line with the

disappearance of the Hartselle sandstone.

MOV, like LIM which adjoins it on the north, lies wholly within Colbert, Lawrence, and Morgan counties. MOV is about 80.5 km long from east to west and between 4.8 and 16.1 km wide. It is an undulating open lowland of low relief whose altitude varies between 175 and 198 m. On the west, in the vicinity of Russellville, a thin veneer of gravel, sand, and clay belonging to the coastal plain covers the valley floor, thickening westward. The valley is wide across Lawrence and western Morgan counties; at its eastern end it narrows at its junction with the northward-trending Cotaco Valley. Streams that head in the MOV or in the northern part of the Cumberland Plateau province to the south cut through LIM in narrow gaps and empty into the Tennessee River.

Climate

The climate is temperate, but humid. Average annual precipitation ranges from 122.6 at Moulton to 131.32 cm at Wheeler dam (Harris and McMaster, 1965). September to October are the driest months, while March receives the greatest amount of precipitation for Colbert County and January for Morgan (Dodson and Harris, 1965). Average annual temperature is about 16.1 C, with an average Summer temperature of about 26.7 C, and an average winter temperature of about 4.4 C.

METHODS

The following collections were examined for records of fish specimens from the study area: AUM (Auburn University Museum), CU (Cornell University), UAIC (University of Alabama Ichthyological Collection), UMMZ (University of Michigan Museum of Zoology), and UT (University of Tennessee). In addition, two monitoring programs by Tennessee Valley Authority (TVA) biologists were incorporated. The first program included regular monitoring of Wheeler, Wilson, and Pickwick reservoirs (1940 to present). Since only the name of the reservoir is listed for locality data, these records were only included in the species accounts. The second monitoring program focused on particular watersheds that drained into TVA reservoirs. Since Flint Creek was one such watershed surveyed and specific locality data was provided, it was included with historic and present records. In both monitoring programs, specimens were field-identified and released, then at a later date entered into a database. If the identification of specimen was questionable, a voucher was preserved; however, it was not typically stored in a museum.

Information on the distribution of fishes was obtained from 183 localities. Of these, 47 were collected in the 1930's by TVA biologists (now cataloged in UMMZ). In the present study, 73 new localities were sampled. In addition, 10 historic sampling locations were chosen at random for resampling. Most samples in this study were taken using a 3 x 1.8 m (3 mm) mesh nylon seine; when necessary a backpack electroshocker was used along with dipnets. For three localities a boat electroshocker was used and fish were dipped with long-handled dipnets. Collecting methods employed at most of the historical sampling locations were probably similar to those above, but also included rotenone, and hoop, gill, and trammel nets in some instances.

Percent occurrence was calculated for each species. This was done by dividing the number of localities where a species was collected by the total number of localities (present and historic) sampled (n=183). Several species showed less than one percent of occurrence, all of which are considered in one of the following categories: locally rare, rare, endangered, or extirpated (Table 1). These categories are noted in the species accounts under the distribution description. Locally rare fishes are those which exhibit a wide-ranging distribution and, though abundant in other parts of their range, are found to have a restricted distribution within the study area. Rare fishes are those which exhibit a wide-ranging distribution and may be abundant in other parts of their range, but within the Tennessee River drainage of Alabama are found to have restricted distributions. Endangered fishes are those which have not been collected on a regular basis in the last 50 years in the study area and may be in danger of disappearing from the survey area. Extirpated fishes are those for which a specific search was conducted within the study area over a suitable time period with proper collecting equipment, but no individuals were found.

Localities were initially located on 1:250,000 USGS and county maps, and then transferred into a digital format. Sample stations were numbered sequentially from downstream to upstream. When sample stations occurred relatively close to one another they were assigned the same number, but given different letters. As a result there are 183 sample localities, but only 153 stations plotted on the maps. Collection data (see Appendix) for all of the 183 sample localities include: station number, state, county, stream name, highway or road number if applicable, distance from nearest town or city, coordinates (township (T), range (R), and section (Sec)), date(s) of collections, and a total species list arranged in phylogenetic order by family and alphabetically within a family (Mayden et al., 1992).

The information provided in the individual species accounts has been standardized as follows: family, scientific name, author(s) name, and common name. A description of the distribution of the species within the survey area follows. Comments on the species habitat are also provided. Terms used for defining habitats are headwater creek (< 5 m), small river (5-25 m), medium river (25-50 m), and large river (more than 50 m). Mud is defined as clay and/or silt substrates. Distribution and habitat information follows observations from this study and comments provided in Page and Burr (1991) and Etnier and Starnes (1993).

A map is provided for each species representing its distribution within the survey area. In most cases each circle represents a sample location; for some it may represent more than one. A black circle indicates the presence of the species, where as an open circle indicates the absence of the species.

Table 1. Percent of occurrence for all species (historic and present) reported by present study.

Scientific Name	Percent Occurrence	Scientific Name	Percent Occurrence	Scientific Name	Percent Occurrence
Petromyzontidae		**Catostomidae**		**Centrarchidae**	
Ichthyomyzon castaneus	<1	*Carpiodes cyprinus*	2	*Ambloplites rupestris*	1
Acipenseridae		*Catostomus commersoni*	9	*Chaenobryttus gulosus*	17
Acipenser fulvescens	<1	*Cycleptus elongatus*	<1	*Lepomis auritus*	4
Scaphirhynchus platorynchus	<1	*Hypentelium nigricans*	16	*L. cyanellus*	57
Lepisosteidae		*Ictiobus bubalus*	8	*L. humilis*	8
Lepisosteus oculatus	6	*I. cyprinellus*	2	*L. macrochirus*	58
L. osseus	3	*I. niger*	3	*L. marginatus*	1
Lepisosteus platostomus	<1	*Minytrema melanops*	19	*L. megalotis*	50
Amiidae		*Moxostoma breviceps*	2	*L. microlophus*	23
Amia calva	4	*Moxostoma duquesnei*	7	*L. punctatus*	1
Anguillidae		*M. erythrurum*	14	*L. cyanellus x L. macrochirus*	2
Anguilla rostrata	<1	**Ictaluridae**		*L. cyanellus x L. microlophus*	1
Hiodontidae		*Ameiurus melas*	8	*L. cyanellus x L. auritus*	<1
Hiodon alosoides	1	*A. natalis*	8	*Micropterus dolomieu*	3
Hiodon tergisus	<1	*A. nebulosus*	3	*M. punctulatus*	21
Clupeidae		*Ictalurus punctatus*	6	*M. salmoides*	32
Alosa chrysochloris	5	*Noturus exilis*	2	*Pomoxis annularis*	6
Dorosoma cepedianum	16	*N. nocturnus*	<1	*Pomoxis nigromaculatus*	5
D. pentenense	2	*Pylodictis olivaris*	2	**Percidae**	
Cyprinidae		**Esocidae**		*Etheostoma blennioides*	<1
Campostoma oligolepis	37	*Esox americanus*	2	*E. caeruleum*	9
Clinostomus funduloides	2	*E. niger*	3	*E. duryi*	36
Cyprinella galactura	2	**Aphredoderidae**		*E. flabellare*	1
C. spiloptera	20	*Aphredoderus sayanus*	1	*E. kennicotti*	3
C. venusta	<1	**Fundulidae**		*E. nigripinne*	33
C. whipplei	17	*Fundulus catenatus*	2	*E. nigrum*	2
Cyprinus carpio	10	*F. notatus*	10	*E. simoterum*	1
Hemitremia flammea	8	*F. olivaceus*	33	*E. tuscumbia*	3
Hybognathus hayi	2	**Poeciliidae**		*Perca flavescens*	2
H. nuchalis	4	*Gambusia affinis*	49	*Percina caprodes*	17
Hybopsis amblops	<1	**Atherinidae**		*P. maculata*	<1
Luxilus chrysocephalus	32	*Labidesthes sicculus*	17	*P. sciera*	9
Lythrurus fasciolaris	33	**Cottidae**		*P. shumardi*	<1
L. fumeus	3	*Cottus carolinae*	28	*P. vigil*	<1
Macrhybopsis storeriana	6	**Moronidae**		*Stizostedion canadense*	5
Notemigonus crysoleucas	8	*Morone chrysops*	2	**Sciaenidae**	
Notropis atherinoides	14	*Morone mississippiensis*	3	*Aplodinotus grunniens*	9
N. boops	2				
N. buchanani	2				
N. volucellus	2				
Opsopoeodus emiliae	8				
Phoxinus erythrogaster	3				
Pimephales notatus	48				
P. vigilax	9				
Rhinichthys atratulus	9				
Semotilus atromaculatus	20				

To compare distributional patterns based on historical and present data, distributions of different species were overlaid in an attempt to locate replicated patterns. Correlations between replicated patterns, physiographic provinces, and other variables were then examined.

RESULTS

A total of 100 different species and three different hybrid *Lepomis* were found in the study area, representing 20 families. No previously unreported species were discovered during this study for either the Tennessee River drainage or the State of Alabama. However, several new records were discovered for the study area and some tributaries of the Tennessee River. Eleven species not previously documented from the study area included *Amia calva, Cyprinella venusta, Hybopsis amblops, Notropis boops, Noturus nocturnus, Fundulus catenatus, Lepomis auritus, Etheostoma blennioides, E. kennicotti, E. nigrum*, and *Perca flavescens*. Several species previously not documented from the seven larger tributaries in the survey area were also collected. Several new records were obtained from Little Bear Creek tributary for *Cyprinella galactura, Notropis volucellus, Phoxinus erythrogaster, Rhinichthys atratulus, Noturus exilis, Micropterus dolomieu, Etheostoma caeruleum, E. blennioides, E. flabellare*, and *Aplodinotus grunniens*. In the Cotaco Creek tributary new records of Opsopoeodus emiliae, Noturus nocturnus, and *Pylodictis olivaris* were obtained. Single records for single species were obtained in Cane (*Micropterus dolomieu*), Spring (*Opsopoeodus emiliae*), Town (*Noturus exilis*), and Flint creeks (*Clinostomus funduloides*).

Within the study area, cyprinids had the greatest number of species (27), followed by percids (16), centrarchids (15), catostomids (11), and ictalurids (7). Petromyzontids, amiids, aphredoderids, poeciliids, atherinids, cottids, and sciaenids had the least number of species (1 per family). Percent occurrence for each species within the survey area is provided in Table 1 and discussed in species accounts. For family level, Poeciliidae had the highest average percent occurrence (49) followed by Cottidae (28). At the species level, *Lepomis macrochirus* had the highest percent of occurrence (58) followed closely by *Lepomis cyanellus* (57), *L. megalotis* (50), *Gambusia affinis* (49), and *Pimephales notatus* (48). Some of the rarest fishes (< 1 % occurrence) found in the survey area included *Cyprinella venusta, Hybopsis amblops, Noturus nocturnus, Etheostoma blennioides, Percina maculata, P. shumardi*, and *P. vigil*.

There were two noticeable patterns replicated when distributions of several different species were compared, one of which is illustrated in Figure 3. This pattern is the composite of 17 different species. The other distribution pattern, a composite of the distributions of the more common species, includes *Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides, Etheostoma duryi, E. nigripinne*, and *Percina caprodes*. Species with this distribution pattern for the most part encompass the entire survey area and representatives were taken from almost every tributary. Comparisons of these two distributional patterns with the physiographic provinces (Fig. 2) reveal no noticeable correlation.

In addition to the species found to occur in the survey area, several species not known to occur in the study area in recent or historical time (i.e. no voucher specimens exist in any museums) may eventually be found to occur in this area. Many of these are found in the main stem of the Tennessee River and as part of their life history may ascend tributaries or enter the mouths of tributaries in the survey area. These include *Carpiodes carpio, C. velifer, Moxostoma anisurum, M. carinatum*, and *Morone saxatilis*. Ramsey (1984) reported *C. carpio* occurring sporadically in the Tennessee River, and TVA biologists have reported it from Wheeler (1950, 1953, 1954), Wilson (1950, 1954), and Pickwick (1949, 1952, 1962, 1977) reservoirs. *Carpiodes velifer* was reported by Boschung (1992) from various localities in the Tennessee River, and monitoring by TVA biologists reported it from Wheeler (1949, 1951, 1952, 1953) and Pickwick (1949, 1951, 1953) reservoirs. Pflieger (1975) and Smith (1979) report that *C. velifer* may be susceptible to siltation and impoundment; this may explain why no specimens were found in the present study. *Moxostoma anisurum* and *M. carinatum* are reported by TVA biologists in Wheeler and Pickwick reservoirs. *Morone saxatilis* has been stocked into many Tennessee River reservoirs (Etnier and Starnes, 1993), and TVA biologists have reported it from Wheeler Reservoir. Some species occur solely in the main stem of the Tennessee River and would probably not occur in the tributaries of the survey area. They include *Ictalurus furcatus* and *Polyodon spathula*. *Ictalurus furcatus* has been reported regularly by TVA biologist from Wheeler, Wilson, and

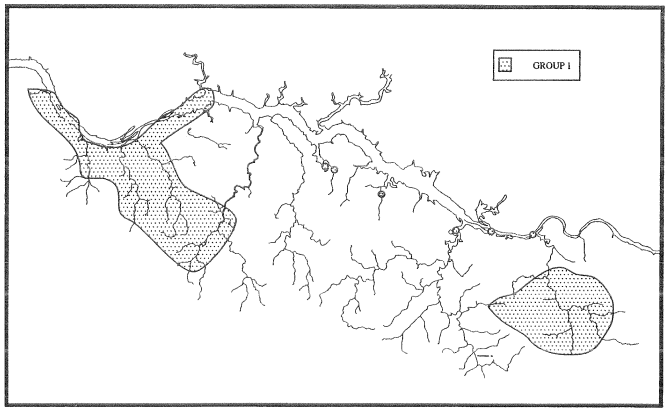


Figure 3. Combined distribution of 17 species, including *Cyprinella galactura, C. venusta, Hybopsis amblops, Lythrurus fumeus, Notropis boops, N. volucellus, Noturus exilis, Esox americanus, Aphredoderus sayanus, Fundulus catenatus, Micropterus dolomieu, Etheostoma blennioides, Etheostoma caeruleum, E. nigrum, E. kennicotti, E. simoterum*, and *Moxostoma duquesnei*.

Pickwick reservoirs. *Polyodon spathula* was reported by TVA biologists from Wheeler (1955, 1956, 1959) and Pickwick (1979) reservoirs. Wallus (1986) documented consistent reproduction of *P. spathula* in the Tennessee and Cumberland rivers in the years 1973-1982. *Typhlichthys subterraneus* is reported from caves of the northern side of the Tennessee River. Given the lack of biological information regarding the vast networks of caves in Morgan and Lawrence counties, it is possible that populations of this species may eventually be found to exist in these areas as well. Lastly, *Carassius auratus* is an Eurasian species introduced into North America in the 1600s; TVA biologists have reported it on a regular basis from Wheeler, Wilson, and Pickwick reservoirs and S. Mettee (pers. comm.) reported it as common in north Alabama. Given its past success, it may soon invade the tributaries of the survey area.

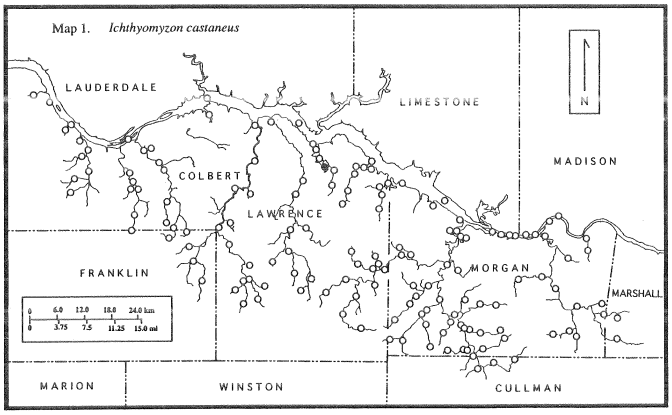
Species Accounts

FAMILY PETROMYZONTIDAE

Ichthyomyzon castaneus Girard, chestnut lamprey

DISTRIBUTION: Found at one locality, Spring Creek embayment (60a); also reported in Pickwick (1980) and Wheeler (1993) reservoirs by TVA biologists. More thorough sampling during spawning period, early May (Etnier and Starnes, 1993), could reveal more records in study area for this species. 60a.

HABITAT: Chestnut lampreys are often found in large rivers, reservoirs attached to large fishes, and smaller streams during spawning. Ammocoetes may be found in sand and silt laden pools and backwaters.

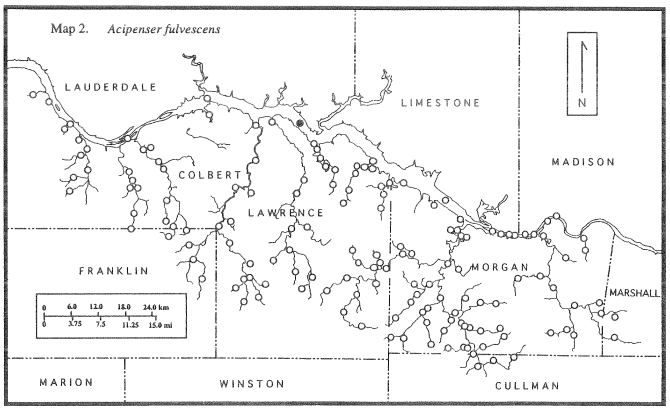


FAMILY ACIPENSERIDAE

Acipenser fulvescens Rafinesque, lake sturgeon

DISTRIBUTION: The only historical locality in the study area is a 1941 trammel net collection (56d) containing six lake sturgeons. Monitoring by TVA biologists on Wheeler, Pickwick, and Wilson since 1949 has not produced a single specimen. Ramsey (1976) reported it from commercial catches as late as 1961. Boschung (1992) considered it probably extirpated from Alabama. 56d.

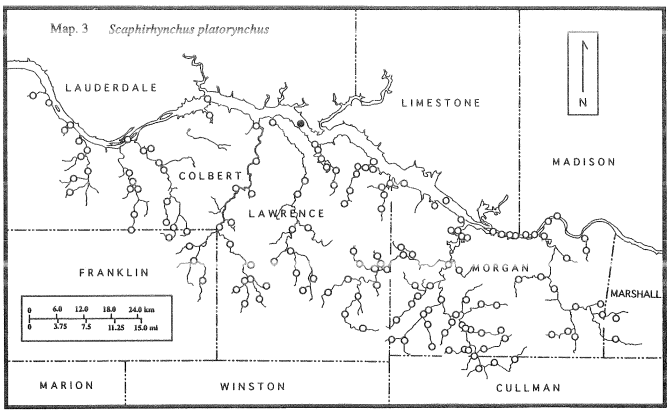
HABITAT: Usually found in deep waters (16-30 ft) of lakes and rivers over mud, gravel, and sand.



Scaphirhynchus platorynchus (Rafinesque), shovelnose sturgeon

DISTRIBUTION: This species may occur sporadically in Tennessee and Cumberland river drainages where only a few museum records are known. It was found at only one locality (56) from Wheeler Reservoir by TVA biologists in 1941. The shovelnose sturgeon was considered by Boschung (1992) to be extirpated from Alabama. 56d.

HABITAT: Inhabits large turbid rivers and is intolerant of impoundments. It requires moderate to swift currents over sand and fine gravel substrates in main channels.

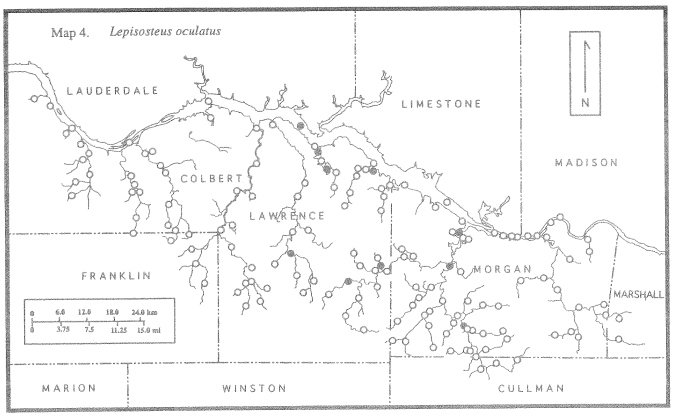


FAMILY LEPISOSTEIDAE

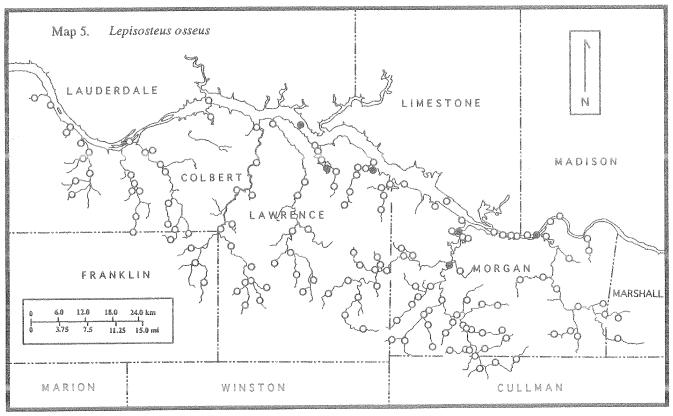
Lepisosteus oculatus (Winchell), spotted gar

DISTRIBUTION: This species was found at several localities in Flint Creek and Wheeler Reservoir; less common in Big Nance Creek. Between 1949 and 1993, TVA biologists have consistently reported it from Wheeler, Pickwick, and Wilson reservoirs. 51, 56a, 58, 60a, 64b, 78a, 78b, 83, 88, 94, 117.

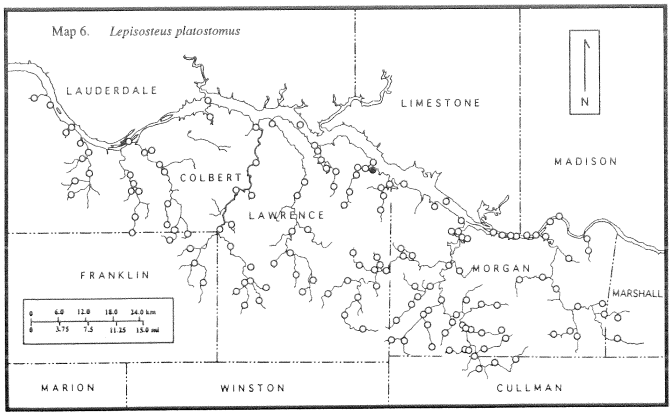
HABITAT: Sluggish pools and backwaters of medium to large rivers with an abundance of vegetation and debris.



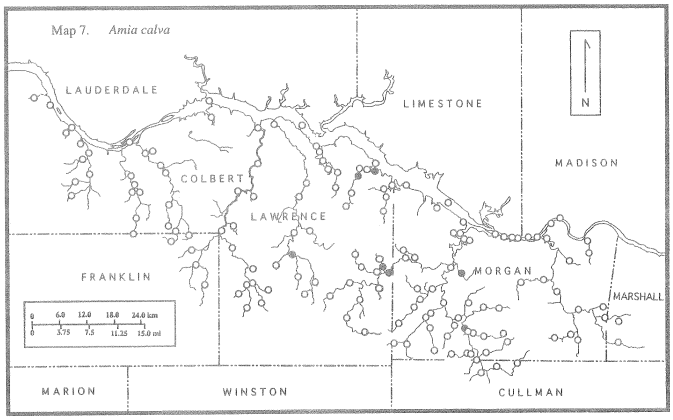
Lepisosteus osseus (Linnaeus), longnose gar
DISTRIBUTION: This species was found associated with backwaters of the Tennessee River except for one locality on Flint Creek. TVA biologists have consistently reported it from Wheeler, Pickwick, and Wilson reservoirs from 1949 to 1993. 56a, 60a, 64b, 78b, 83, 136.
HABITAT: Reservoirs, sluggish pools, backwaters, and oxbows of medium to large rivers.



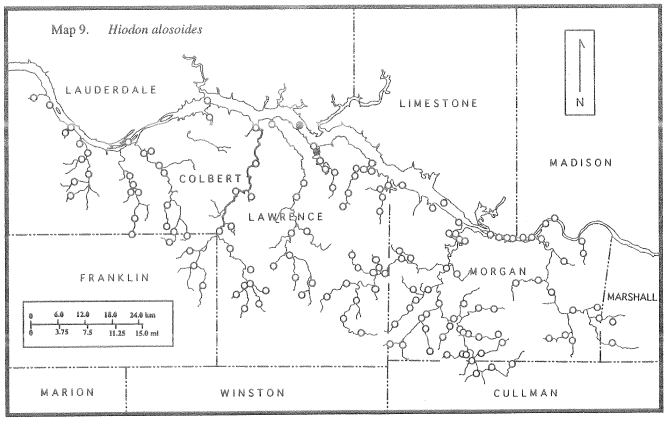
Lepisosteus platostomus Rafinesque, shortnose gar
DISTRIBUTION: This species was found at only one locality, Mallard Creek (64b). TVA biologists have reported it sporadically from Wheeler (1949-1973), Pickwick (1952-1980), and Wilson (1949-1977) reservoirs. 64b.
HABITAT: Pools and backwaters, generally avoiding current and rooted aquatic vegetation, of small to large rivers.



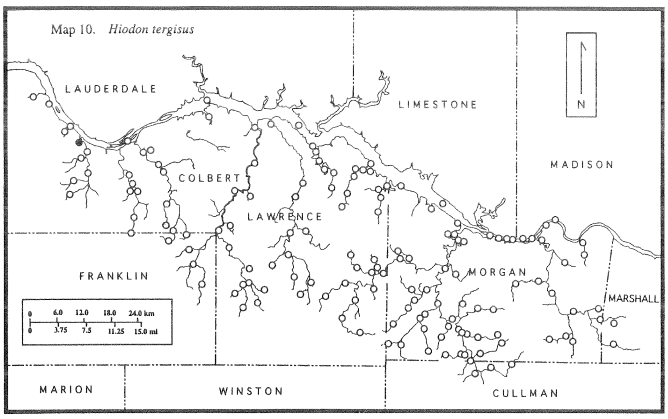
FAMILY AMIIDAE
Amia calva Linnaeus, bowfin
DISTRIBUTION: Previous to this study, no records were known for this species from the study area. Bowfin were obtained in Big Nance, Mallard, and Flint creeks. 51, 64b, 67, 82, 87, 88, 117.
HABITAT: Swamps, pools, sloughs, and backwaters of lowland streams. Usually associated with submersed vegetation.



FAMILY HIODONTIDAE
Hiodon alosoides (Rafinesque), goldeye
DISTRIBUTION: Locally probably extirpated from the Tennessee River due to impoundments, most recent collections were made in 1936 and 1938 by TVA biologists. 56a, 58.
HABITAT: Deep open pools and channels of medium to large, often turbid, lowland rivers.



Hiodon tergisus Lesueur, mooneye
DISTRIBUTION: This species was reported from the mouth of Cane Creek in 1972; TVA biologists have sporadically reported it from Wheeler (1950-1980), Wilson (1950-1976), and Pickwick (1952-1977) reservoirs. The less than one percent occurence found by this study is probably misleading based on these records. 5.
HABITAT: Deep open pools and channels of medium to large rivers; lakes and impoundments.

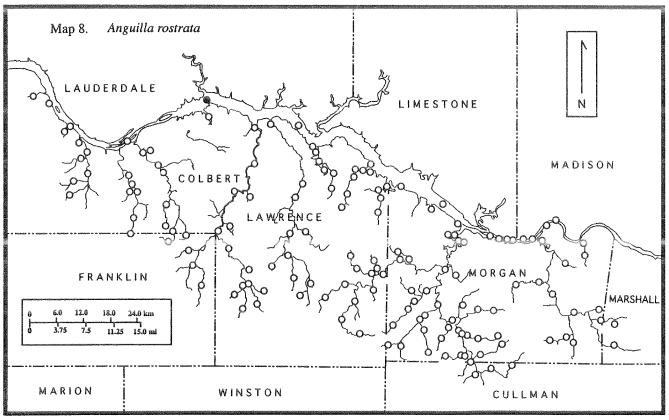


FAMILY ANGUILLIDAE

Anguilla rostrata (Lesueur), American eel

DISTRIBUTION: Represented by one collection made by TVA biologists in 1938. In addition to this, TVA biologists have reported it from Pickwick reservoir in 1958, 1959, and 1974. The only other record (Boschung, 1992) is from the Paint Rock River. The impoundment of the Tennessee may represent a significant barrier to this species and may be responsible for reducing populations. 28b.

HABITAT: Usually in permanent streams with continuous flow, hides during daylight in deep pools near logs and boulders or in undercut banks.

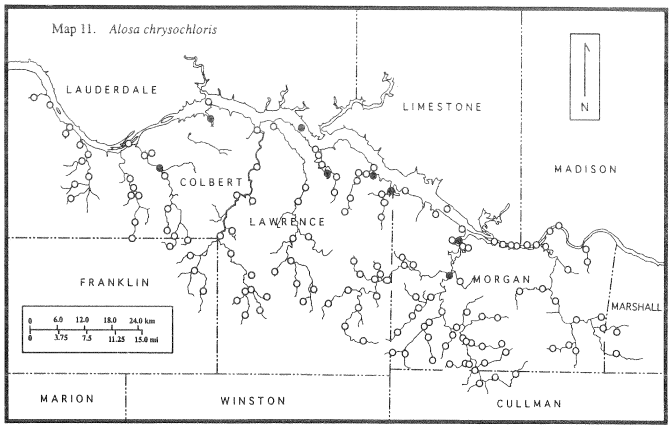


FAMILY: CLUPEIDAE

Alosa chrysochloris (Rafinesque), skipjack herring

DISTRIBUTION: It was found in Spring and Flint creeks, but was more abundant in the Tennessee River. 20a, 27a, 27b, 56b, 60a, 60b, 64b, 70a, 78b, 83.

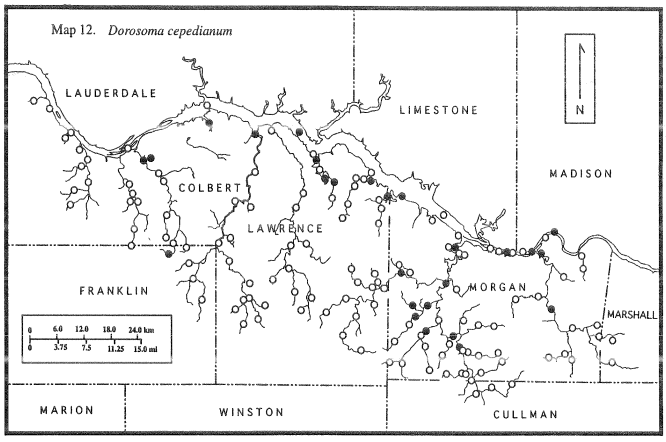
HABITAT: Open water of clear to moderately turbid, medium to large rivers and large reservoirs. A schooling species usually in current over sand and gravel.



Dorosoma cepedianum (Lesueur), gizzard shad

DISTRIBUTION: It was found in Spring, Flint, and Cotaco creeks, but was most abundant in Tennessee River. 18, 19, 25, 27a, 27b, 29, 56b, 58, 60a, 60d, 61, 64b, 70a, 70b, 74, 78b, 83, 86, 99b, 100, 101, 105, 113, 117, 133, 136, 137, 141, 151.

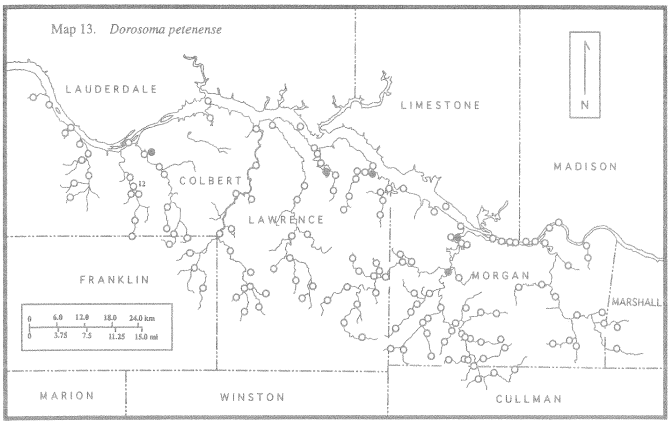
HABITAT: Most common in deep, open water of medium to large rivers, lakes, reservoirs, and developed pools.



Dorosoma petenense (Guenther), threadfin shad

DISTRIBUTION: Found in Spring (18) and Flint (83) creeks, this species was more common in the Tennessee River. 18, 60a, 64b, 78b, 83.

HABITAT: Lakes, backwaters, and pools of medium to large rivers; usually in open water over sand, mud, and debris.

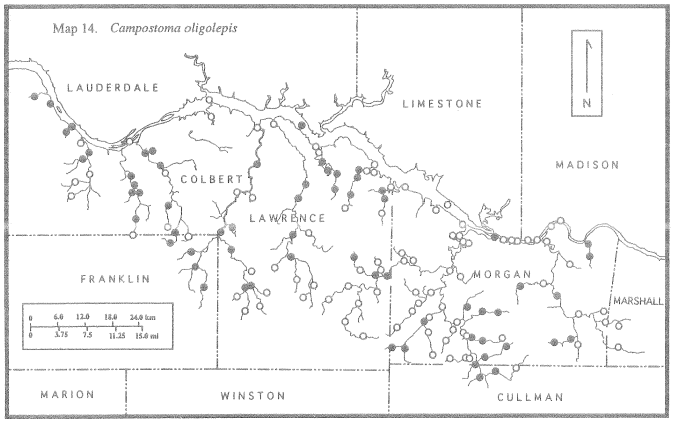


FAMILY CYPRINIDAE

Campostoma oligolepis Hubbs and Greene, largescale stoneroller

DISTRIBUTION: Locally common (Table 1) and found in all tributaries to the Tennessee River. 1, 2, 3a, 3d, 3e, 4, 6, 7a, 7b, 11, 12, 13, 14, 15, 18, 19, 20a, 22, 24, 25, 26, 30, 33, 34, 35, 36, 37, 38, 40, 43, 47, 48, 50, 51, 56c, 59, 60b, 61, 62, 66, 67, 68, 71a, 71c, 72, 87, 90, 92, 106, 109, 110, 114b, 115, 116, 119, 120, 125, 126, 127, 128, 129, 131b, 140, 141, 143, 144, 152, 153.

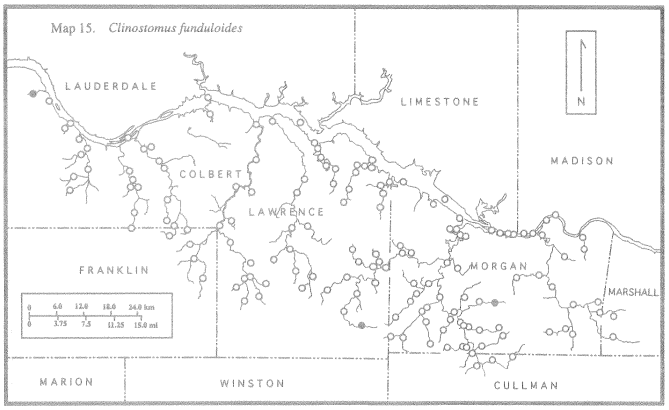
HABITAT: Rocky riffles and runs of clear creeks and small to medium rivers.



Clinostomus funduloides Girard, rosyside dace

DISTRIBUTION: Restricted to Flint, West Flint and Colbert creeks, this represents the southernmost distribution of this species, as well as a new record for Flint Creek. 1, 98, 116.

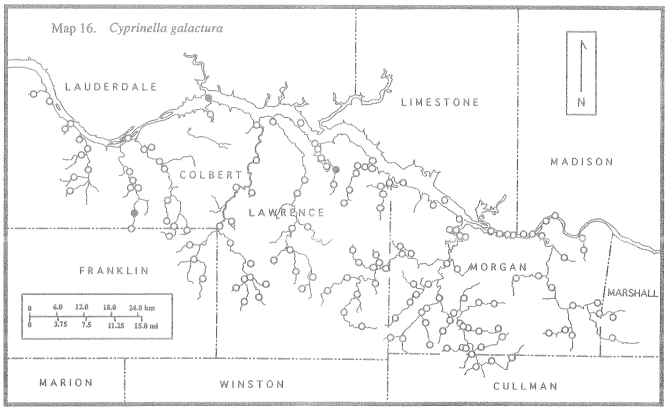
HABITAT: Rocky flowing pools of head waters, creeks, and small rivers; most common in small clear streams.



Cyprinella galactura (Cope), whitetail shiner

DISTRIBUTION: Only found in 3 localities, one of which represents a new record for Little Bear Creek. 15, 28b, 61.

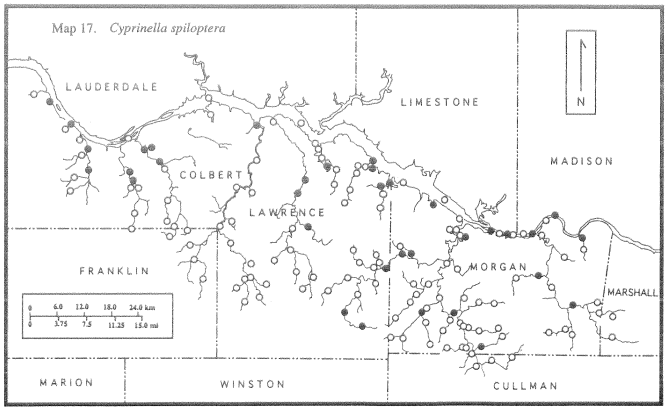
HABITAT: Rocky runs, less often pools and riffles, of clear head waters, creeks, and small rivers.



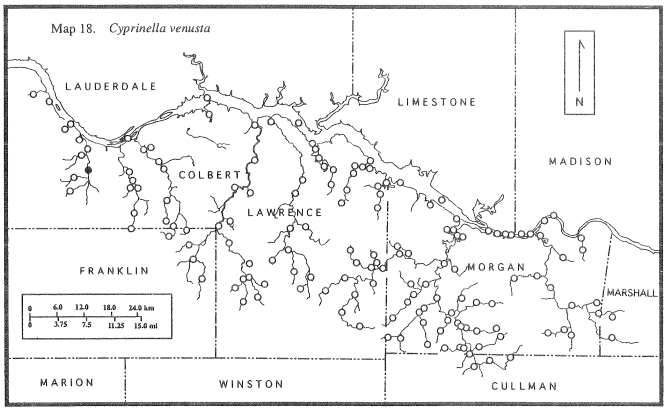
Cyprinella spiloptera (Cope), spotfin shiner

DISTRIBUTION: Locally abundant (Table 1), found in all tributaries. This represents the southernmost distribution for this species. 2, 3d, 6, 8, 11, 12, 18, 19, 20a, 20b, 29, 47, 48, 49, 60c, 63c, 64a, 70a, 70b, 71b, 75, 80, 84, 86, 87, 97, 98, 106, 113, 126, 131a, 133, 136, 139, 145, 151, 152.

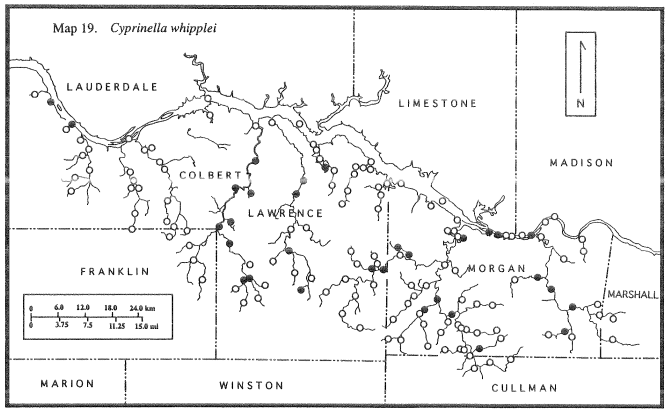
HABITAT: Sand and gravel runs and pools of creeks, small to medium (sometimes large) rivers, and reservoirs.



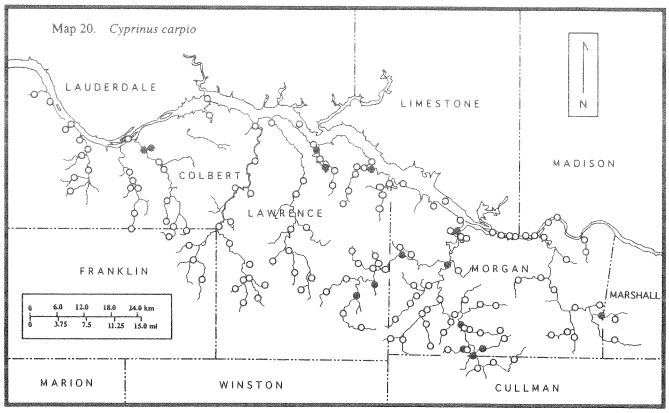
Cyprinella venusta Girard, blacktail shiner
DISTRIBUTION: Found only at one locality in Cane Creek, a new record for this tributary. The only other record in the Tennessee River drainage is from Bear Creek. 8.
HABITAT: Most common in sandy pools and runs of small to medium rivers; also in creeks and rocky pools and runs.



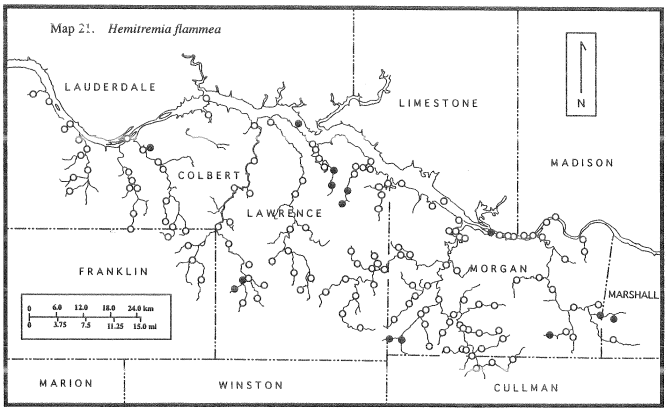
Cyprinella whipplei Girard, steelcolor shiner
DISTRIBUTION: Found in all tributaries except Cane and Little Bear creeks. 2, 3a, 30, 31, 32, 33, 34, 38, 40, 43, 47, 48, 51, 55, 60a, 80, 84, 85, 87, 90, 104, 105, 113, 126, 131a, 131b, 132, 136, 139, 141, 143, 145.
HABITAT: Rocky and sandy runs, less often pools, of creeks and small to medium rivers. Most common near riffles.



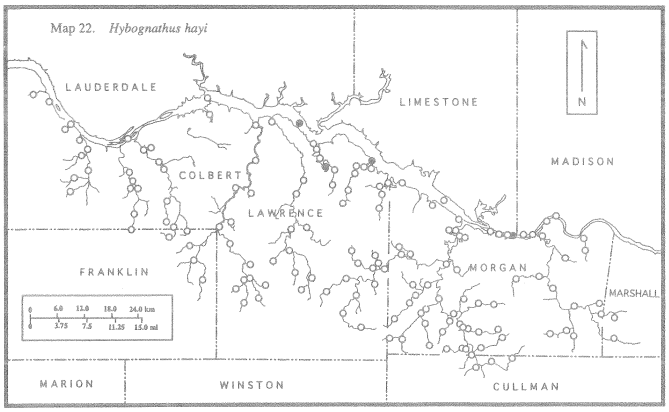
Cyprinus carpio Linnaeus, common carp
DISTRIBUTION: Locally abundant especially in the Flint Creek system. 18, 19, 58, 60a, 64b, 78b, 83, 86, 93, 96, 117, 122a, 125, 126, 147.
HABITAT: Muddy pools of small to large rivers; lakes and ponds. Most common in man-made lakes and in turbid, sluggish streams containing large amounts of organic matter.



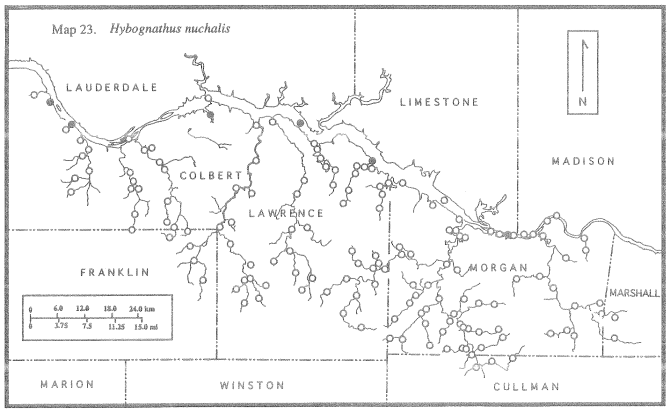
Hemitremia flammea (Jordan and Gilbert), flame chub
DISTRIBUTION: Several new populations were discovered in the study area, all of which were in springs or spring-fed headwater streams. This probably represents the southernmost distribution for this species. 18, 43, 44, 56c, 61, 62, 68, 69, 109, 110, 131a, 144, 147, 148.
HABITAT: Springs and spring-fed streams; usually over gravel.



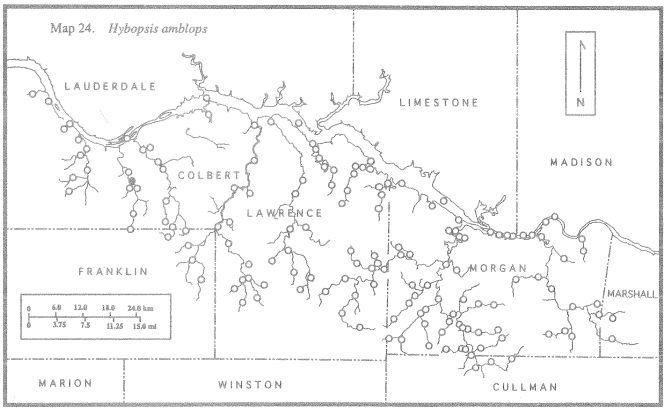
Hybognathus hayi Jordan, cypress minnow
DISTRIBUTION: It is restricted to lowlands associated with the Tennessee River, only recorded from TVA collections (1936-1938) and believed to be extirpated from the Tennessee River drainage in the state (Boschung, 1992). 56a, 60b, 63c, 134.
HABITAT: Swamps, oxbows, and backwaters and pools of sluggish streams; usually over mud and near detritus.



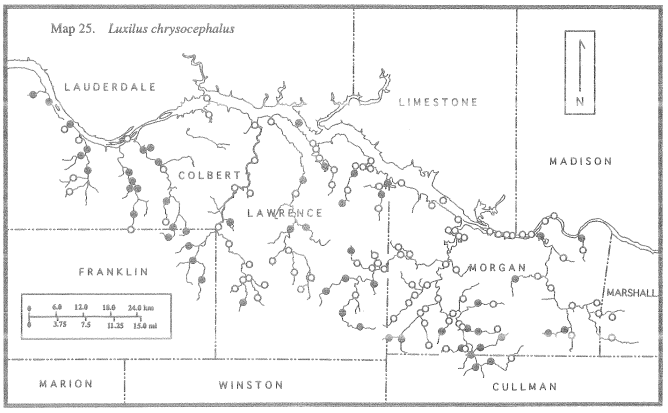
Hybognathus nuchalis Agassiz, Mississippi silvery minnow
DISTRIBUTION: It is restricted to lowlands associated with the Tennessee River, only recorded from TVA collections (1936-1938) and believed to be extirpated from the Tennessee River drainage in the state (Boschung, 1992). 2, 3a, 3c, 27b, 56b, 63c, 133.
HABITAT: Pools and backwaters of low gradient creeks and small to large rivers.



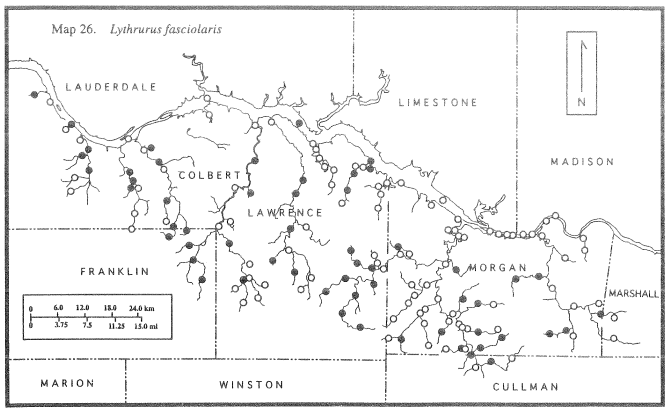
Hybopsis amblops (Rafinesque) bigeye chub
DISTRIBUTION: Trautman (1981) and Smith (1979) attributed increased siltation to the decrease in populations in Ohio and Illinois. Locally rare found at only one locality (12) in Little Bear Creek, a new record for this tributary, Boschung (1992) reports them as being common north of the Tennessee River. 12.
HABITAT: Rocky pools with current, usually near riffles and vegetation. It exhibits an intolerance to reservoirs and siltation.



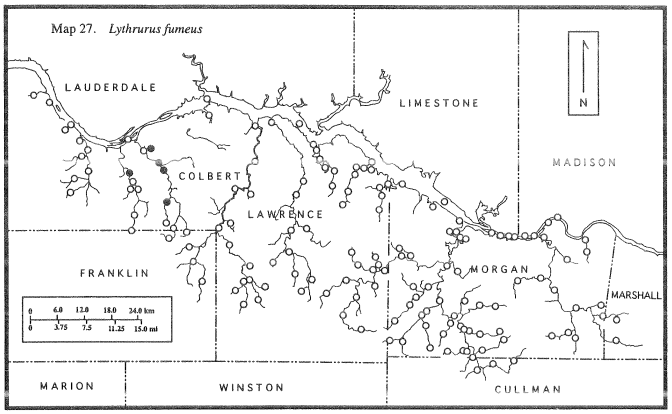
Luxilus chrysocephalus Rafinesque, striped shiner
DISTRIBUTION: Locally common, it was found in all tributaries surveyed. 1, 2, 3a, 3d, 3e, 6, 7a, 7b, 8, 11, 12, 13, 14, 15, 18, 19, 20a, 20b, 22, 24, 25, 26, 33, 35, 36, 37, 45, 47, 49, 50, 56c, 60b, 67, 69, 70b, 72, 92, 93, 94, 95, 97, 98, 109, 110, 112, 115, 119, 120, 122a, 125, 126, 127, 128, 129, 137, 140, 143, 144, 152.
HABITAT: Rocky pools near riffles in clear to fairly turbid creeks and small to medium rivers.



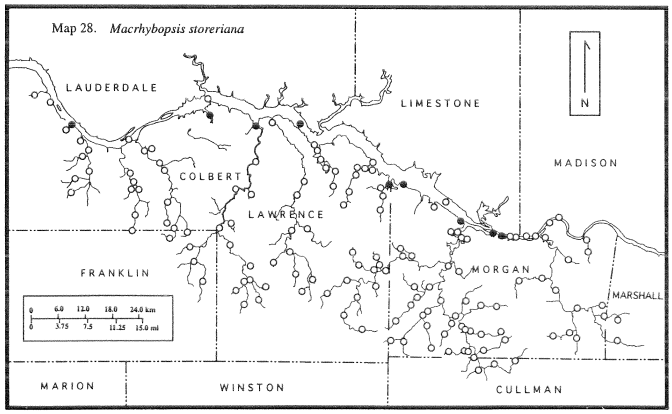
Lythrurus fasciolaris (Gilbert), scarletfin shiner
DISTRIBUTION: Locally common, found in all tributaries studied. This probably represents the southernmost distribution for this species. Observed at locality 20 to occur in sympatry with *L. fumeus*. Within the stream portion they seemed to occupy separate microhabitats; *L. fasciolaris* occurred in a fast flowing gravel and bedrock riffle, and *L. fumeus* occurred upstream in a sand and mud pool. 1, 3a, 3d, 6, 7a, 7b, 8, 11, 12, 13, 18, 20a, 24, 25, 26, 30, 31, 35, 36, 37, 38, 43, 47, 48, 50, 52, 53, 56c, 63a, 63b, 64a, 67, 68, 82, 85, 90, 91, 92, 93, 94, 95, 96, 97, 98, 109, 112, 114b, 115, 120, 122a, 125, 126, 127, 129, 139, 140, 143, 144, 147.
HABITAT: Rocky pools and runs of clear, fairly fast head waters, creeks, and small rivers.



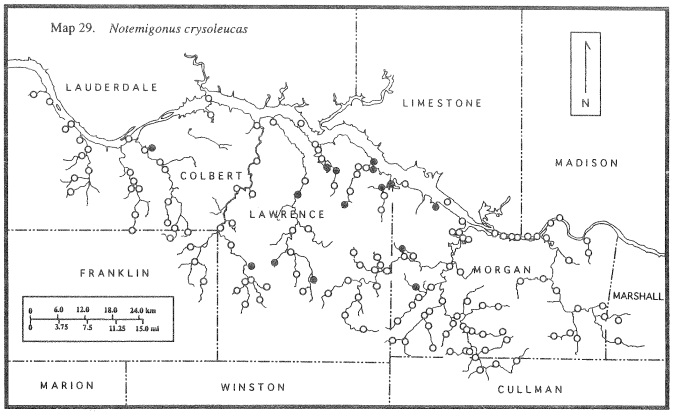
Lythrurus fumeus (Evermann), ribbon shiner
DISTRIBUTION: Found only in Spring and Little Bear creeks. See distribution notes of *L. fasciolaris*. 18, 20a, 21, 22.
HABITAT: Quiet, usually turbid, mud- or sand-bottomed pools of head waters, creeks, and small rivers. Observed tuberculate males at the outflow of Tuscumbia Spring (18) in September 1994, over fine gravel and sand substrates in clear water.



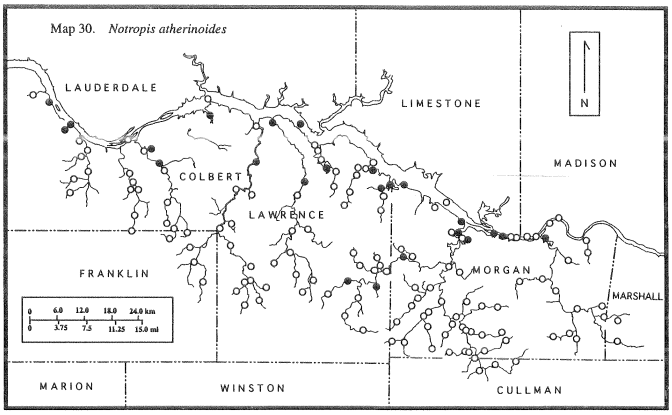
Macrhybopsis storeriana (Kirtland), silver chub
DISTRIBUTION: Within the study area, it is restricted to the Tennessee River. These records are from TVA collections made between 1936 and 1938. 3c, 27b, 29, 56a, 56b, 70a, 70b, 74, 77a, 131b, 132.
HABITAT: Sand-silt, and sometimes gravel-bottomed pools and backwaters of small to large rivers; lakes.



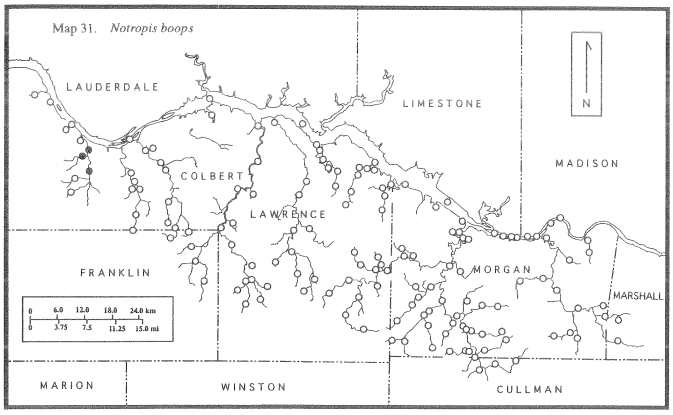
Notemigonus crysoleucas (Mitchill), golden shiner
DISTRIBUTION: It was found in all tributaries except Cotaco, Little Bear, and Cane creeks. 18, 39, 48, 52, 54, 60b, 61, 63c, 64b, 69, 70a, 71b, 75, 85, 100.
HABITAT: Vegetated lakes, ponds, swamps, backwaters and pools of creeks and small to medium rivers.



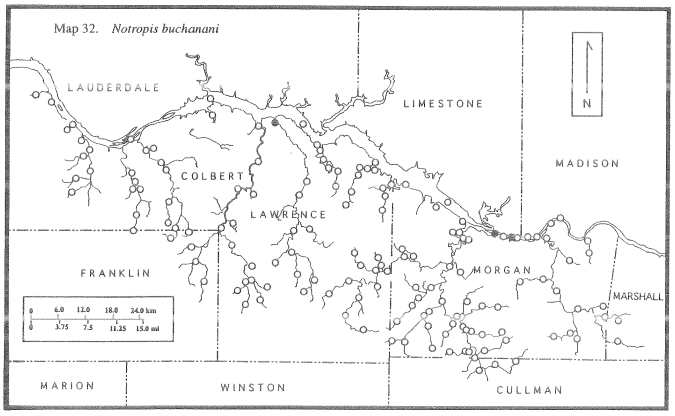
Notropis atherinoides Rafinesque, emerald shiner
DISTRIBUTION: It was found everywhere except Little Bear and Cane creeks. In addition, it has not been collected in Flint Creek since 1938. 2, 3d, 4, 18, 20a, 27b, 30, 46, 47, 56b, 56c, 60a, 60d, 64b, 70a, 71b, 74, 77a, 78b, 80, 86, 93, 94, 131b, 132, 137.
HABITAT: Pools and runs of medium to large rivers, lakes, reservoirs; most common in clear water over sand or gravel.



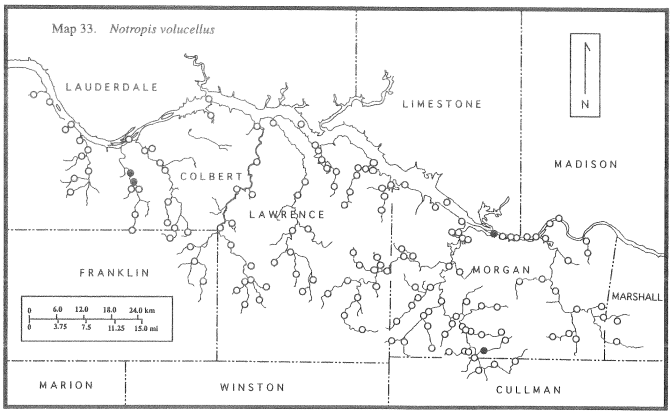
Notropis boops Gilbert, bigeye shiner
DISTRIBUTION: It was found only in Cane Creek. 6, 7b, 8.
HABITAT: Flowing, usually clear and rocky, pools of creeks and small to medium rivers; often near emergent vegetation along the stream margin.



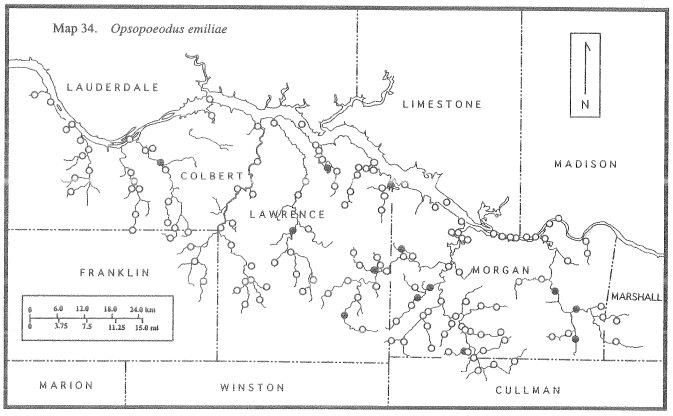
Notropis buchanani Meek, ghost shiner
DISTRIBUTION: Locally it was represented in a few collections made by TVA biologists (1936-1938). Boschung (1992) reports it from the backwaters of Wilson and Wheeler Pools. In addition it was recently collected just north of the Tennessee River in the Elk River (UAIC, uncataloged). 46, 131b, 133.
HABITAT: Quiet pools and backwaters, usually over sand, of small to large rivers.



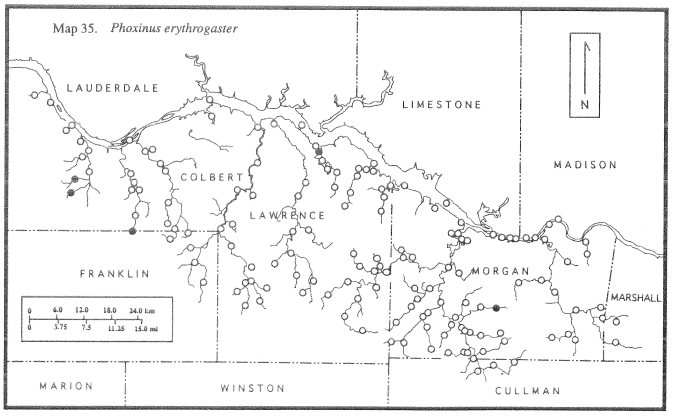
Notropis volucellus (Cope), mimic shiner
DISTRIBUTION: It is found in many different places north of the Tennessee River, but was uncommon in the study area. 11, 12, 126, 131b.
HABITAT: Sandy Pools of head waters, creeks, and small to large rivers; quiet areas of lakes.



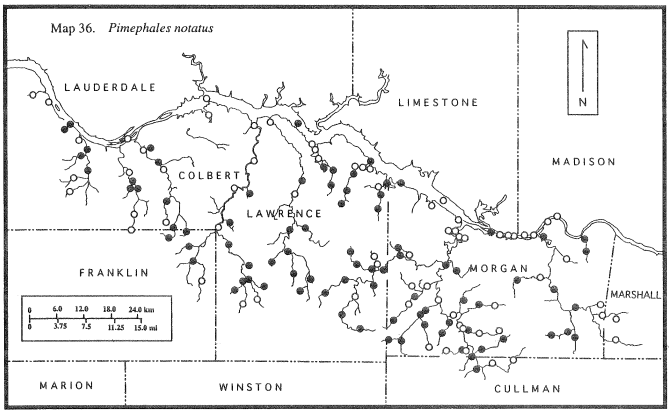
Opsopoeodus emiliae Hay, pugnose minnow
DISTRIBUTION: It was found in Spring, Big Nance, Flint and Cotaco creeks. 20a, 50, 60b, 60d, 70a, 85, 90, 97, 99b, 101, 122b, 141, 142, 145.
HABITAT: Clear to turbid vegetated lakes, swamps, oxbows, and sluggish streams of all sizes.



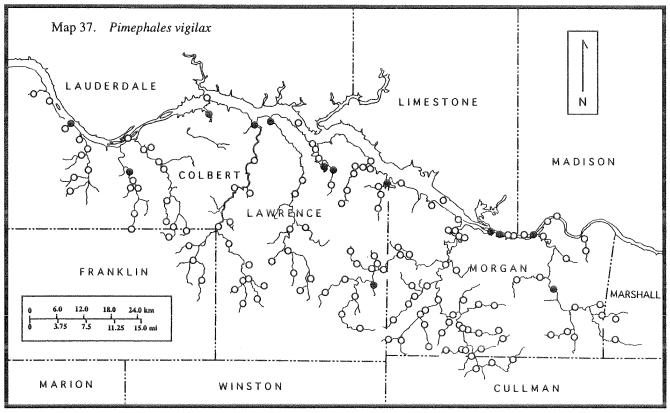
Phoxinus erythrogaster (Rafinesque), southern redbelly dace
DISTRIBUTION: It is restricted to headwaters of Cane, Little Bear, and Flint creeks. 9, 10, 16, 58, 116.
HABITAT: Rocky, usually spring-fed; pools of head waters and creeks.



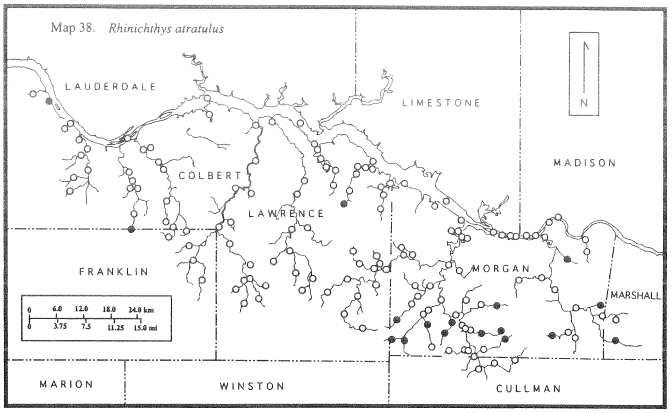
Pimephales notatus (Rafinesque), bluntnose minnow
DISTRIBUTION: It was found in all tributaries sampled. 3d, 4, 6, 7a, 7b, 8, 12, 13, 14, 18, 20a, 20b, 22, 24, 25, 26, 31, 33, 35, 36, 38, 39, 40, 41, 43, 44, 47, 49, 50, 51, 52, 53, 54, 55, 56c, 60b, 60c, 61, 62, 63c, 67, 68, 69, 70a, 72, 73, 74, 82, 83, 85, 86, 87, 90, 91, 92, 93, 94, 95, 97, 98, 101, 103, 106, 107, 109, 110, 111b, 112, 114b, 115, 119, 122a, 122b, 125, 126, 127, 128, 131a, 137, 140, 141, 142, 143, 144, 145, 152, 153.
HABITAT: Can be found almost anywhere in its range, but most common in clear rocky streams.



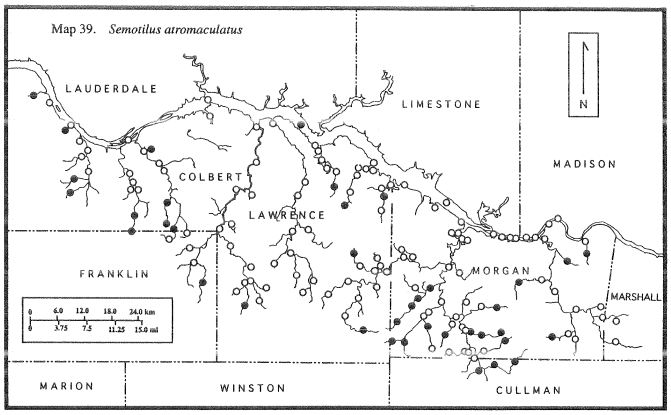
Pimephales vigilax (Baird and Girard), bullhead minnow
DISTRIBUTION: Locally it was not as abundant as *P. notatus*, being found along Tennessee River and in Little Bear, Flint, and Cotaco creeks. 3a, 3d, 11, 27b, 29, 46, 60b, 60c, 61, 70a, 70b, 93, 105, 131b, 132, 136, 141.
HABITAT: Quiet pools and runs over sand, silt, or gravel, in small to large rivers. Most common in medium-sized rivers.



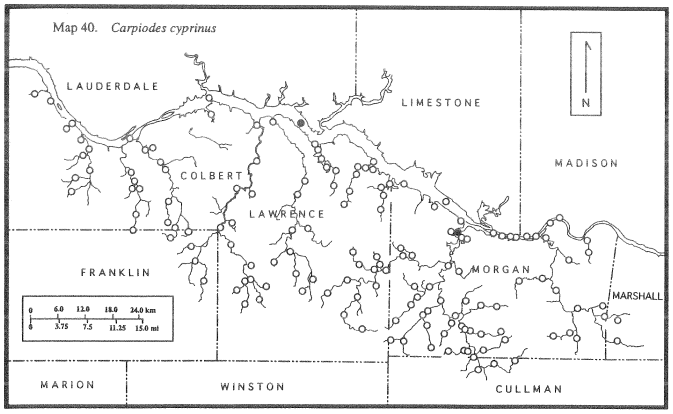
Rhinichthys atratulus (Hermann), blacknose dace
DISTRIBUTION: Restricted to springs and headwater streams of Mallard, Flint, Cotaco, and Little Bear creeks. 2, 16, 69, 103, 107, 109, 110, 111b, 112, 116, 120, 121, 127, 138, 144, 146, 149.
HABITAT: Rocky runs and pools of head waters, creeks, and small rivers.



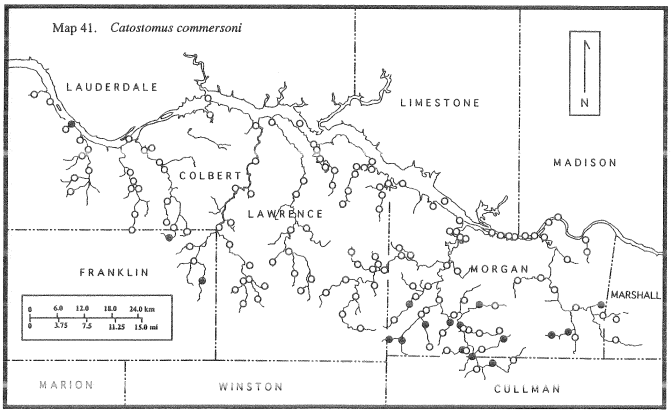
Semotilus atromaculatus (Mitchill), creek chub
DISTRIBUTION: It was locally abundant, found in all tributaries except Big Nance Creek. 1, 4, 9, 10, 15, 16, 18, 22, 23, 24, 37, 45, 56c, 62, 69, 72, 92, 98, 99a, 101, 102, 103, 107, 109, 110, 112, 116, 119, 120, 121, 127, 128, 129, 130, 138, 140, 144, 153.
HABITAT: Rocky and sandy pools of head waters, creeks and small rivers.



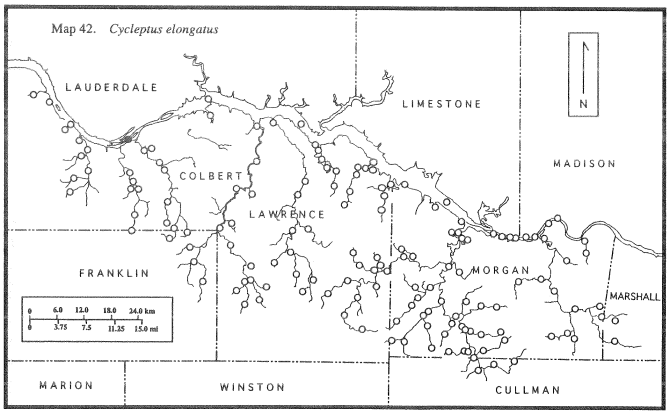
FAMILY CATOSTOMIDAE
Carpiodes cyprinus (Lesueur), quillback
DISTRIBUTION: Only represented by UMMZ collections (1936-1938) made by TVA biologists in the Tennessee River. Yearly monitoring by TVA biologists has produced specimens at Wheeler (1950, 1954), Wilson (1950, 1953, 1954), and Pickwick (1949, 1952, 1962, 1977) reservoirs. 56a, 56b, 78a.
HABITAT: Pools and backwaters of creeks and small to large rivers; lakes and reservoirs.



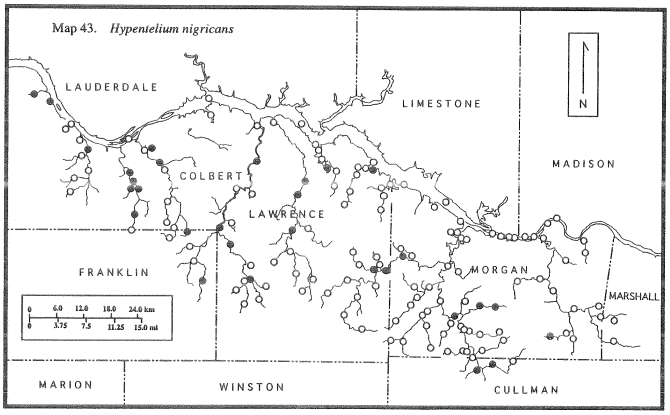
Catostomus commersoni (Lacepede), white sucker
DISTRIBUTION: It is most abundant in Flint Creek, also found in Spring, Town, and Cotaco creeks. This represents the southernmost distribution of this species. 3c, 25, 37, 102, 107, 109, 110, 111b, 115, 117, 122a, 125, 127, 129, 143, 144, 146.
HABITAT: Wide range of habitats from rocky pools and riffles of head waters to large lakes. Usually in small, clear, cool creeks and small to medium rivers.



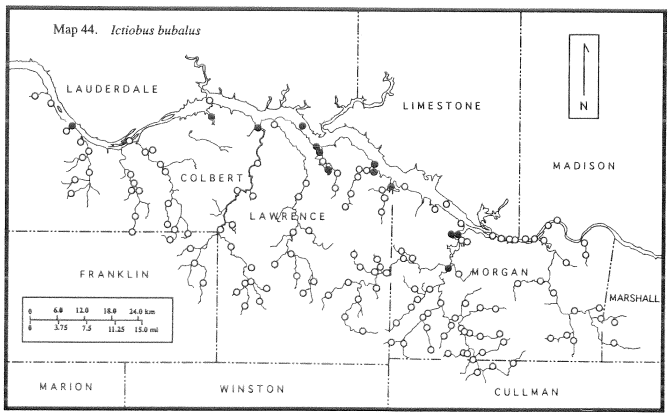
Cycleptus elongatus (Lesueur), blue sucker
DISTRIBUTION: Represented by one TVA locality (1939). G. Jenkins, a TVA biologist, (pers. comm.) reported shocking this species occasionally below the tailwaters of Pickwick Dam. 17b.
HABITAT: Strong current in deep (1-2.5 m) chutes and main channels of medium to large rivers over bedrock, sand, and gravel.



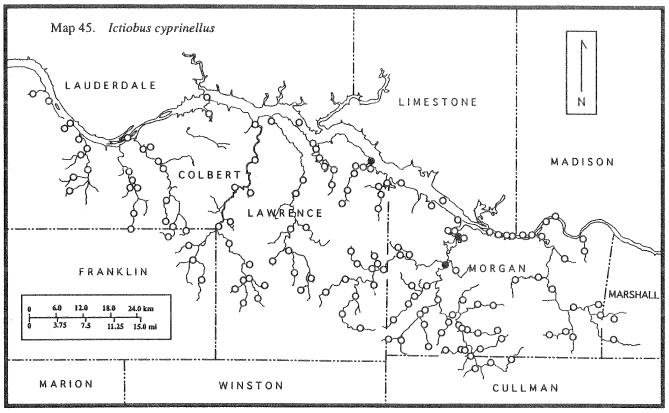
Hypentelium nigricans (Lesueur), northern hogsucker
DISTRIBUTION: Locally widespread, found in all tributaries. 1, 2, 6, 11, 12, 13, 14, 15, 18, 20a, 26, 30, 34, 37, 38, 40, 47, 48, 50, 60b, 64a, 86, 87, 90, 113, 115, 116, 128, 129, 144.
HABITAT: Rocky riffles, runs, and pools of clear creeks and small rivers; occasionally large rivers and impoundments.



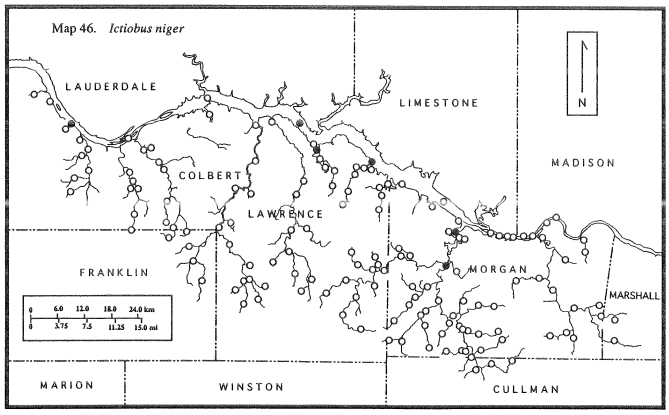
Ictiobus bubalus (Rafinesque), smallmouth buffalo
DISTRIBUTION: Locally restricted to theTennessee River and the mouths of a few tributaries. TVA biologists have records from Wheeler, Wilson and Pickwick reservoirs. 3c, 27b, 29, 56a, 56b, 57, 58, 60a, 60d, 63c, 64b, 70a, 78b, 79, 83.
HABITAT: Pools, backwaters, and main channels of small to large rivers; impoundments; lakes.



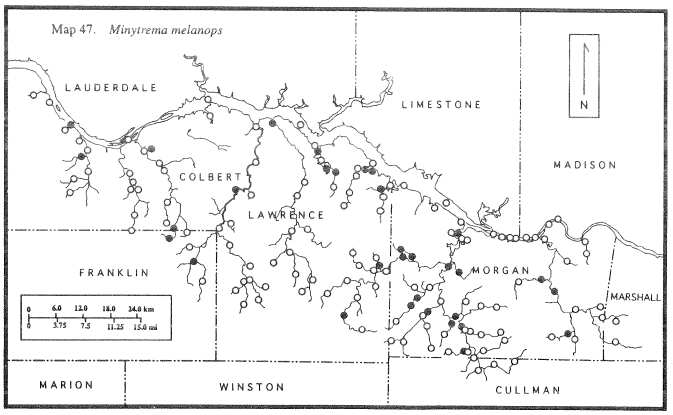
Ictiobus cyprinellus (Valenciennes), bigmouth buffalo
DISTRIBUTION: Locally found only in the mouths of Mallard and Flint creeks. TVA biologists have reported it from Wheeler, Wilson, and Pickwick reservoirs. 63c, 81, 83.
HABITAT: Main channels, pools, and backwaters of small to large rivers; lakes and impoundments.



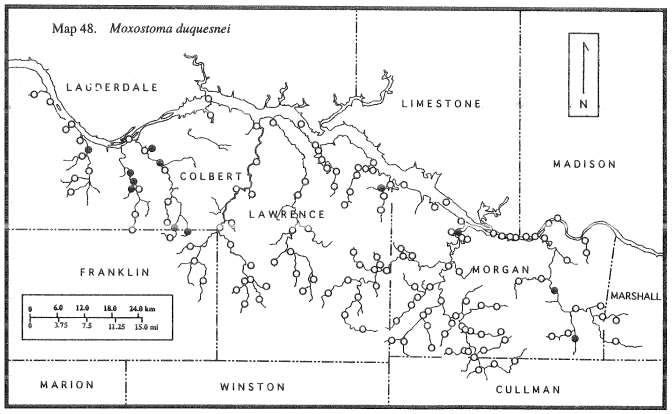
Ictiobus niger (Rafinesque), black buffalo
DISTRIBUTION: Locally restricted to Tennessee River and mouths of Spring, Mallard, and Flint creeks. TVA biologists have reported it from Wheeler reservoir. 3b, 56b, 58, 63c, 78a, 83.
HABITAT: Pools and backwaters of small to large rivers; impoundments; lakes.



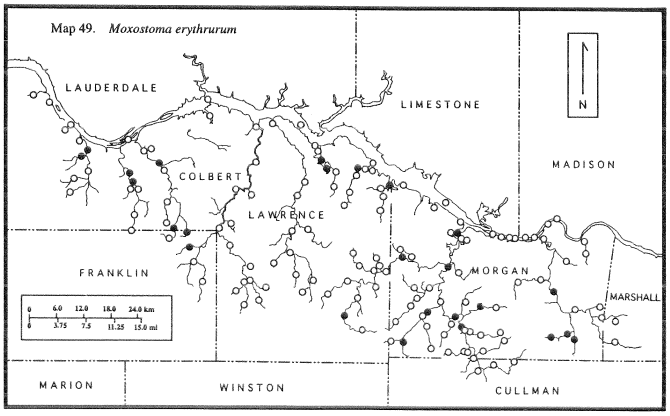
Minytrema melanops (Rafinesque), spotted sucker
DISTRIBUTION: Locally common, found in all tributaries except Cane Creek. A large tuberculate male was collected at (111b) Mack Creek on 10 April 1994. 3a, 3c, 7b, 18, 24, 25, 32, 36, 46, 58, 60a, 60b, 61, 64b, 65, 71c, 78b, 82, 83, 84, 85, 86, 88, 97, 101, 102, 105, 111b, 113, 117, 122a, 139, 141, 143.
HABITAT: Long deep pools of small to medium rivers over clay, sand, or gravel; occasionally creeks, large rivers, and impoundments.



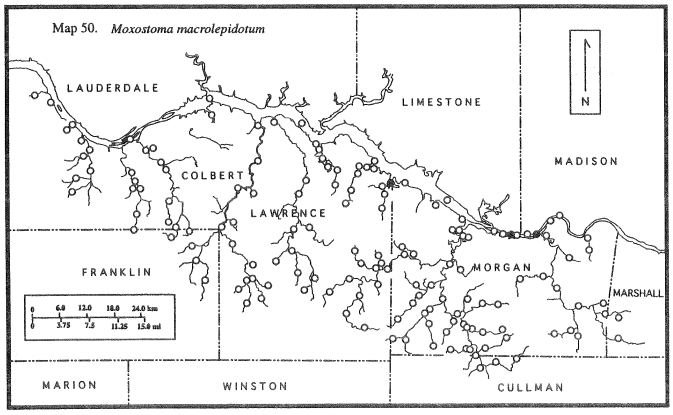
Moxostoma duquesnei (Lesueur), black redhorse
DISTRIBUTION: It was found in all tributaries except Spring, Town, and Big Nance creeks. 6, 11, 12, 13, 18, 20a, 24, 26, 71a, 78a, 141, 142.
HABITAT: Sand to rock bottomed pools and runs of creeks and small to medium rivers; impoundments.



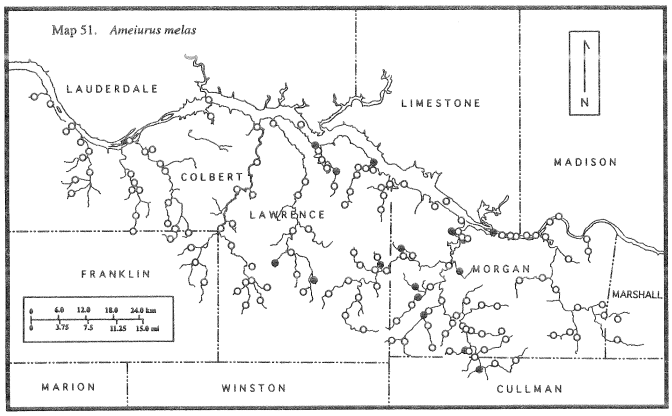
Moxostoma erythrurum (Rafinesque), golden redhorse
DISTRIBUTION: It was locally common, found in all tributaries except Town and Big Nance creeks. 6, 7a, 11, 12, 20a, 24, 26, 35, 59, 60c, 66, 70a, 78b, 83, 86, 97, 105, 109, 113, 115, 117, 141, 142, 143, 144.
HABITAT: Mud to rock-bottomed pools, runs and riffles of creeks and small to large rivers; occasionally lakes, and reservoirs.



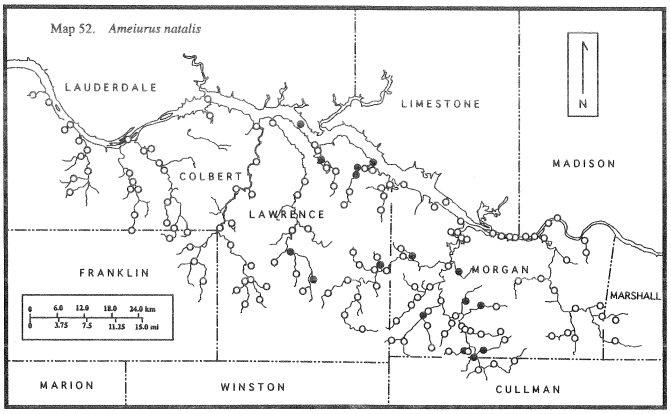
Moxostoma macrolepidotum (Lesueur), shorthead redhorse
DISTRIBUTION: Only represented by three UMMZ collections made by TVA biologists (1936-1938), however TVA biologists have reported it from Wheeler (1972, 1975, 1984) and Pickwick (1957, 1962, 1971, 1976, 1979, 1980) reservoirs. 70a, 133, 136.
HABITAT: Rocky pools, runs, and riffles in small to large rivers; lakes and reservoirs.



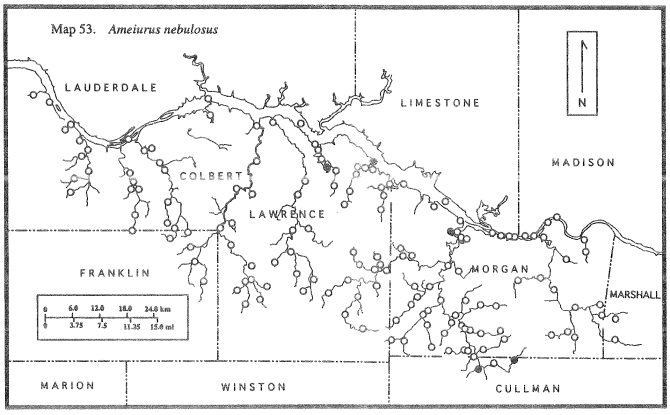
FAMILY: ICTALURIDAE
Ameiurus melas (Rafinesque), black bullhead
DISTRIBUTION: It was found in Big Nance and Flint creeks as well as backwaters of the Tennessee River. 52, 54, 57, 61, 63c, 79, 82, 85, 88, 100, 101, 106, 122a, 128, 131a.
HABITAT: Pools, backwaters, and sluggish current over soft substrates in creeks and small to large rivers; impoundments, oxbows, and ponds.



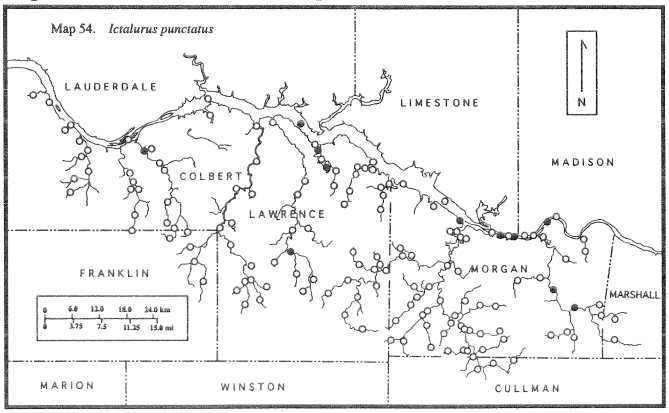
Ameiurus natalis (Lesueur), yellow bullhead
DISTRIBUTION: It was found in Big Nance, and Flint creeks as well as backwaters of the Tennessee River. 51, 54, 56, 59, 63c, 66, 67, 82, 84, 88, 106, 114b, 115, 122a, 125, 126.
HABITAT: Pools, backwaters, and sluggish current over soft substrates in creeks and small to large rivers; oxbows, ponds, and impoundments.



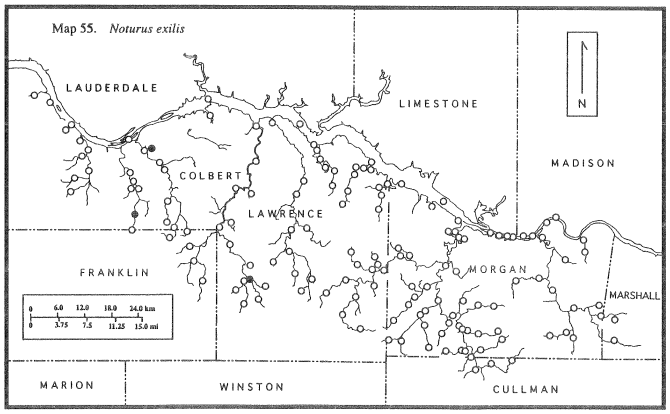
Ameiurus nebulosus (Lesueur), brown bullhead
DISTRIBUTION: Within the study area, it is restricted to backwaters of the Tennessee River. 60b, 63c, 79, 128, 130.
HABITAT: Pools and sluggish runs over soft substrates in creeks and small to large rivers; impoundments, lakes, and ponds.



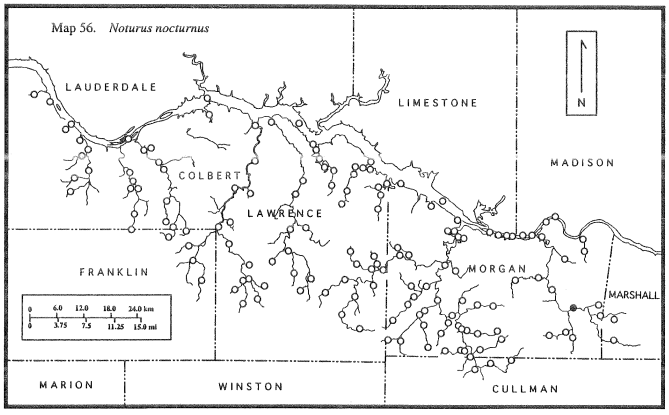
Ictalurus punctatus (Rafinesque), channel catfish
DISTRIBUTION: It was found in Cotaco, Big Nance and Spring creeks. 19, 51, 56d, 58, 60a, 77a, 132, 134, 141, 145, 150.
HABITAT: Deep pools and runs over sand or rocks in small to large rivers; lakes. Avoids upland streams.



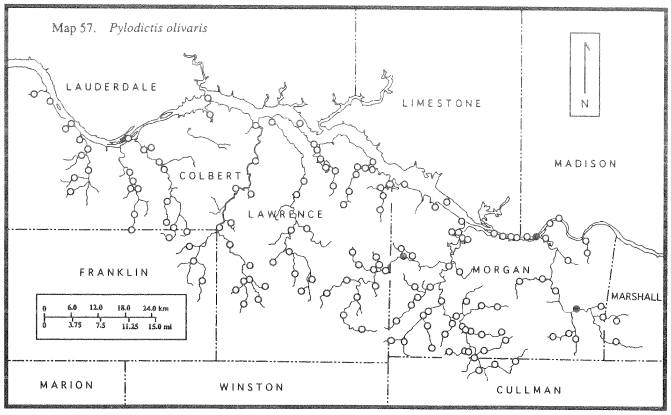
Noturus exilis Nelson, slender madtom
DISTRIBUTION: Only found at 3 localities in Spring, Little Bear, and Town creeks. This represents the southernmost distribution for this species in Alabama. 15, 18b, 40.
HABITAT: Rocky riffles, runs, and flowing pools of clear creeks and small rivers; rarely in springs and along wave-swept margins of large impoundments.



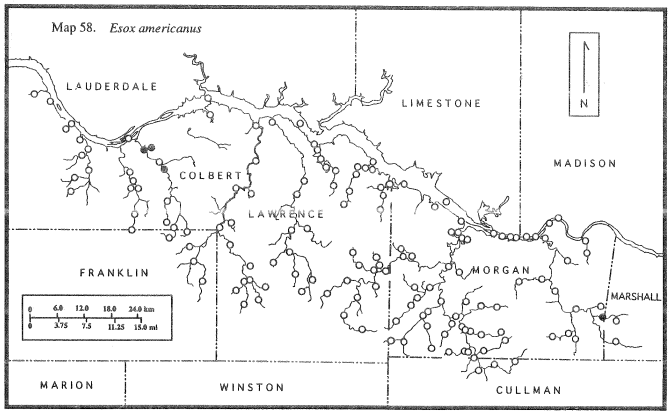
Noturus nocturnus Jordan and Gilbert, freckled madtom
DISTRIBUTION: It was found at one locality in Cotaco Creek. The only other records for this species from Alabama are in the Bear Creek system (Wall, 1968), just west of the study area. 145.
HABITAT: Rock, Mud, or detritus bottomed pools and backwaters of lowland creeks and small to large rivers; lakes.



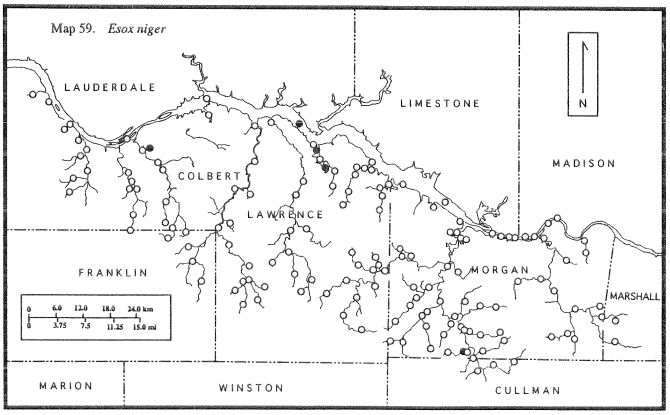
Pylodictis olivaris (Rafinesque), flathead catfish
DISTRIBUTION: It was found in two tributaries, Cotaco and Flint creeks. TVA biologists have reported it from Wheeler, Wilson, and Pickwick reservoirs. 86, 136, 145.
HABITAT: Pools with logs and other debris in low to moderate gradient, small to large rivers; lakes; impoundments.



FAMILY ESOCIDAE
Esox americanus Gmelin, grass or redfin pickerel
DISTRIBUTION: It was only found in Spring and Cotaco creeks. 18, 19, 21, 147.
HABITAT: Lakes, swamps, and backwaters, and sluggish pools of streams. Usually among vegetation in clear water.



Esox niger Lesueur, chain pickerel
DISTRIBUTION: This species was only found in Spring and Flint creeks. 18, 56b, 58, 60b, 122a.
HABITAT: Vegetated lakes, swamps, and backwaters and quiet pools of creeks and small to medium rivers.

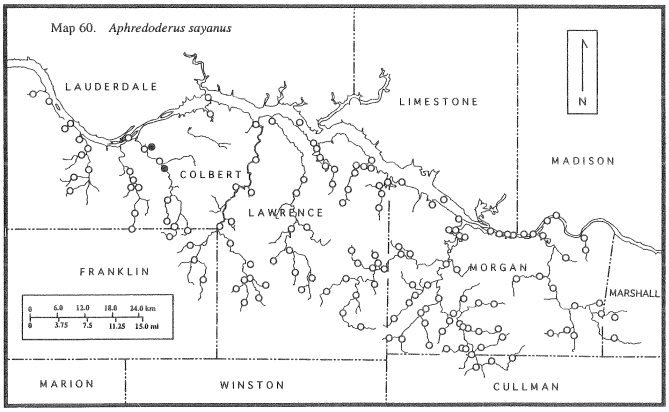


FAMILY APHREDODERIDAE

Aphredoderus sayanus (Gilliams), pirate perch

DISTRIBUTION: It was only found in Spring Creek. 18, 21.

HABITAT: Swamps, vegetated sloughs, ponds, lakes, backwaters, and quiet pools of creeks and small to large rivers. Usually over mud.

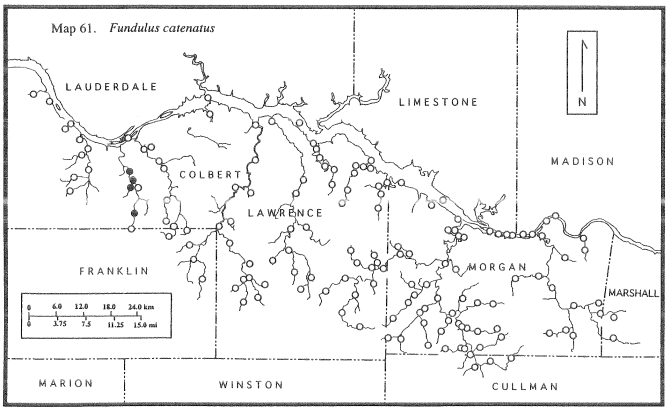


FAMILY: FUNDULIDAE

Fundulus catenatus (Storer), northern studfish

DISTRIBUTION: This species was only found in Little Bear Creek. 11, 12, 13, 15.

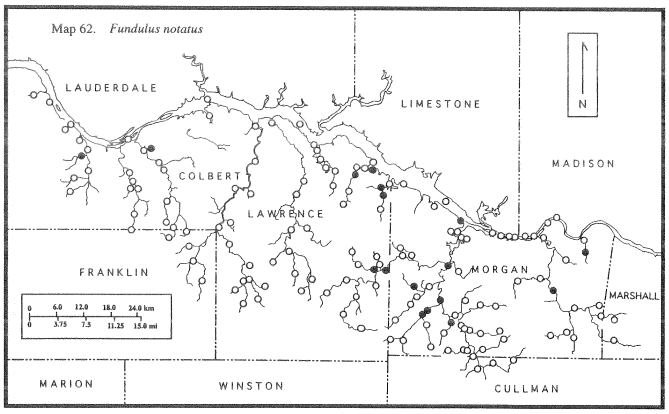
HABITAT: Margins, pools, and backwaters of creeks and small to medium rivers; most common in shallow sandy backwaters of clean rocky creeks.



Fundulus notatus (Rafinesque), blackstripe topminnow

DISTRIBUTION: It was found in all tributaries except Little Bear, Town, and Big Nance creeks. 7a, 18, 64b, 67, 71b, 71c, 72, 77b, 83, 87, 90, 100, 104, 105, 106, 111a, 141, 153.

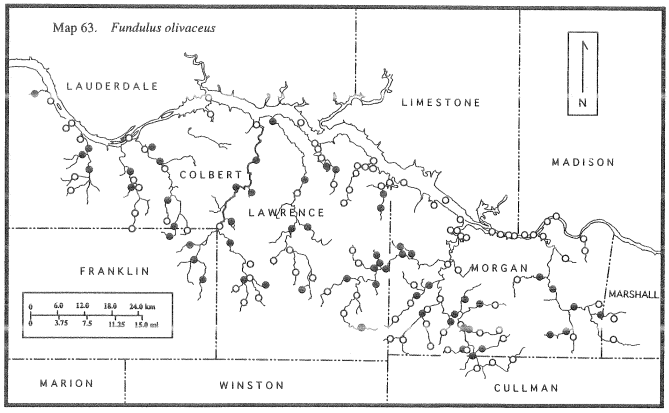
HABITAT: Quiet surface water, usually near margins of creeks and small rivers, ponds, and lakes.



Fundulus olivaceus (Storer), blackspotted topminnow

DISTRIBUTION: It was found in all tributaries, more common than *F. notatus*. 1, 6, 7a, 7b, 8, 11, 13, 18, 20a, 22, 24, 25, 30, 31, 32, 33, 35, 36, 37, 38, 41, 43, 46, 47, 49, 50, 55, 60b, 61, 72, 73, 84, 85, 86, 87, 88, 89, 90, 93, 94, 98, 99a, 101, 106, 111a, 113, 114a, 114b, 115, 118, 119, 122a, 125, 126, 139, 141, 143, 144, 145, 147.

HABITAT: Near the surface of quiet to flowing water, usually near margins of clear, sandy to gravelly head waters, creeks, and small rivers.

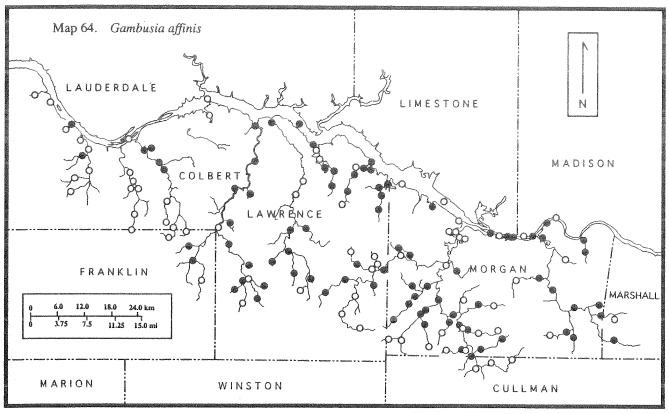


FAMILY: POECILIIDAE

Gambusia affinis (Baird and Girard), mosquitofish

DISTRIBUTION: It was locally abundant, found in all tributaries. 3a, 7b, 18, 19, 20a, 20b, 21, 29, 30, 31, 32, 33, 35, 36, 38, 39, 41, 42, 43, 44, 46, 49, 50, 51, 52, 53, 54, 56b, 56c, 57, 60b, 61, 62, 63a, 63c, 64a, 65, 67, 68, 70a, 70b, 71b, 71c, 72, 73, 75, 82, 84, 85, 87, 91, 93, 94, 95, 99a, 99b, 100, 101, 102, 103, 104, 105, 106, 107, 111a, 111b, 113, 115, 117, 119, 122a, 125, 126, 127, 131b, 133, 134, 136, 137, 139, 141, 142, 143, 145, 146, 147, 149, 150, 152, 153.

HABITAT: Standing to slow flowing water; most common in vegetated ponds and lakes, backwaters and quiet pools of streams. Frequents brackish water.

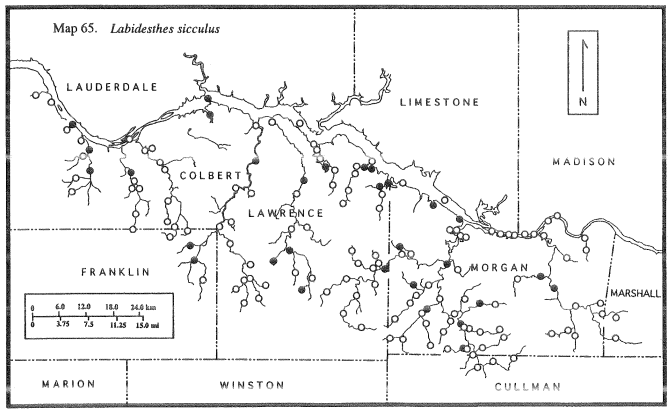


FAMILY: ATHERINIDAE

Labidesthes sicculus (Cope), brook silverside

DISTRIBUTION: It was found in all tributaries except Spring Creek. 3a, 6, 8, 11, 27b, 28b, 30, 35, 36, 47, 51, 52, 55, 60b, 60c, 64b, 65, 70a, 71b, 75, 77a, 83, 85, 87, 100, 105, 115, 117, 122a, 139, 141.

HABITAT: Near surface of lakes, ponds, and quiet pools of creeks and small to large rivers, usually in open water.

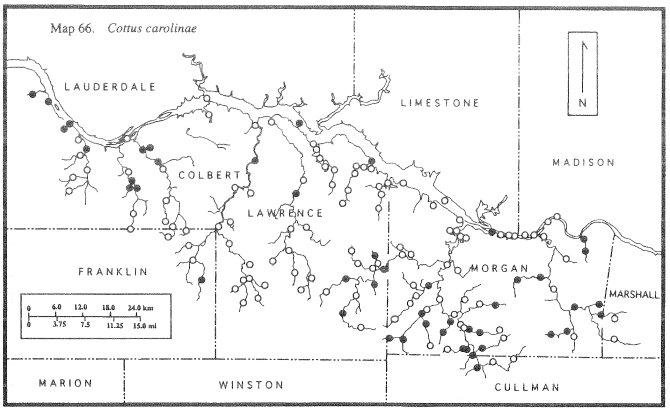


FAMILY: COTTIDAE

Cottus carolinae (Gill), banded sculpin

DISTRIBUTION: It was found in all tributaries. 1, 2, 3d, 3e, 4, 6, 12, 13, 14, 18, 19, 20a, 20b, 30, 37, 48, 56c, 63c, 87, 89, 93, 94, 97, 99a, 99b, 106, 107, 109, 110, 111a, 111b, 112, 116, 119, 120, 122a, 122b, 123, 125, 126, 128, 131a, 139, 140, 143, 144, 145, 146, 147, 152, 153.

HABITAT: Gravel and rubble riffles of head waters, creeks, and small rivers; springs and their effluents. I observed large individuals in an unnamed cave (123).

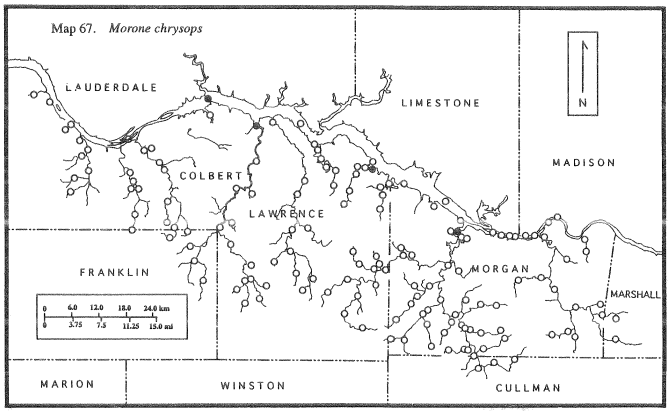


FAMILY: MORONIDAE

Morone chrysops (Rafinesque), white bass

DISTRIBUTION: In the study area, it is restricted to the Tennessee River. TVA biologists report it from Wheeler, Wilson, and Pickwick reservoirs. 28a, 29, 64b, 78b.

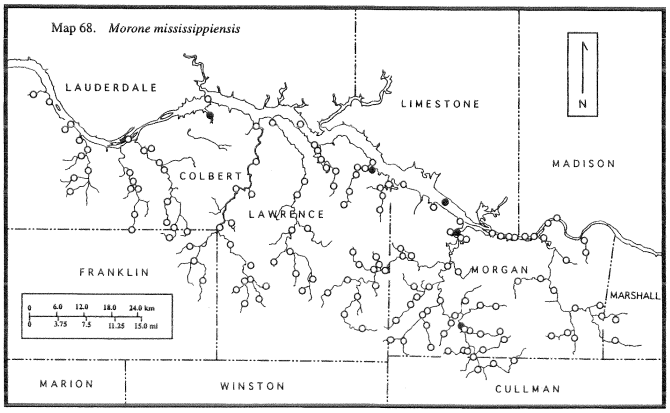
HABITAT: Lakes, ponds, and pools of small to large rivers.



Morone mississippiensis Jordan and Eigenmann, yellowbass

DISTRIBUTION: It was found along the Tennessee River, and at one locality on Flint Creek. In addition, it is reported by TVA biologists in Wheeler, Pickwick, and Wilson reservoirs. 27b, 64b, 76, 78b, 117.

HABITAT: Pools and backwaters of small to large rivers; ponds and lakes. It is less tolerant of turbid waters than is the white bass.

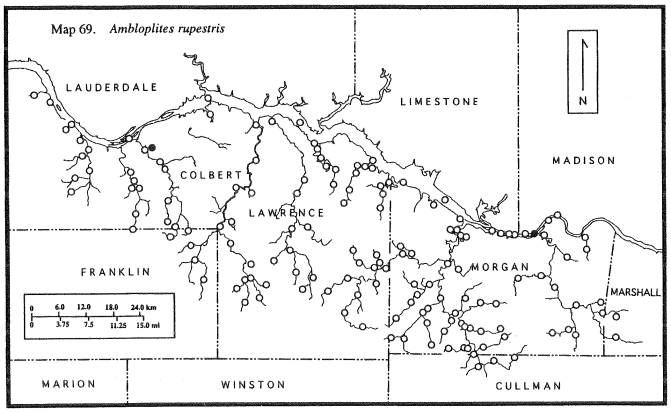


FAMILY: CENTRARCHIDAE

Ambloplites rupestris (Rafinesque), rockbass

DISTRIBUTION: This species was taken at 2 localities, Gilbert (1891) mentions this species as being abundant at several localities in this area. 18, 136.

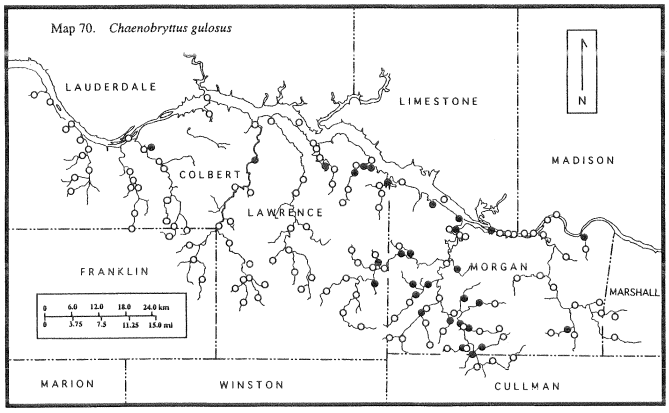
HABITAT: Vegetated and brushy stream margins and pools of creeks and small to medium rivers; rocky and vegetated margins of lakes. Most common in clear, silt-free rocky streams.



Chaenobryttus gulosus (Cuvier), warmouth

DISTRIBUTION: It was abundant in Flint Creek, also found in Spring, Town, and Cotaco creeks and Tennessee River. 18, 30, 60b, 64b, 65, 67, 70a, 75, 77a, 78b, 82, 84, 86, 88, 93, 99b, 100, 101, 106, 111a, 114a, 114b, 115, 117, 119, 122a, 125, 126, 131a, 143, 152.

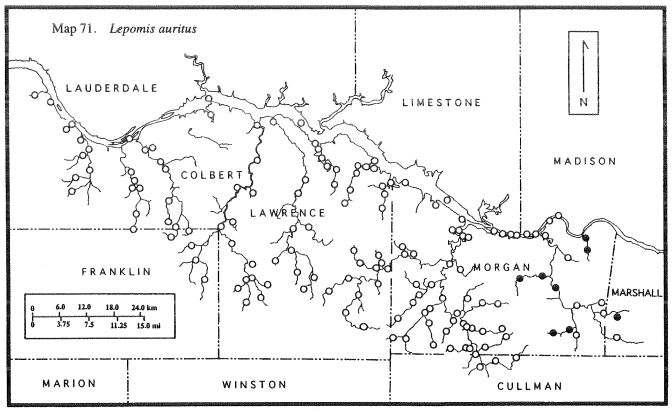
HABITAT: Vegetated lakes, ponds, swamps and quiet water areas of streams; usually over mud.



Lepomis auritus (Linnaeus), redbreast sunfish

DISTRIBUTION: It ass found in Cotaco and Dry creeks, probably the result of introductions. 139, 140, 141, 143, 144, 148, 152, 153.

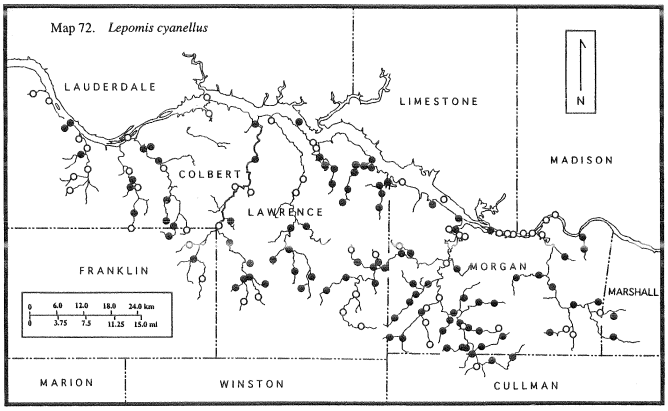
HABITAT: Rocky and sandy pools of creeks and small to medium rivers; rocky vegetated lake margins.



Lepomis cyanellus Rafinesque, green sunfish

DISTRIBUTION: Locally abundant, found in all tributaries. 3a, 3c, 3e, 4, 7a, 7b, 12, 13, 15, 18, 19, 20b, 22, 23, 24, 25, 29, 30, 33, 36, 38, 39, 40, 41, 43, 44, 49, 50, 51, 52, 53, 54, 55, 56c, 59, 60b, 60c, 61, 62, 63c, 64b, 65, 66, 67, 68, 69, 70a, 71b, 71c, 72, 73, 75, 77a, 78b, 82, 84, 86, 87, 88, 90, 91, 93, 94, 95, 99a, 99b, 100, 101, 102, 103, 106, 109, 110, 111a, 111b, 112, 113, 114a, 114b, 115, 116, 117, 119, 120, 122a, 123, 124, 125, 126, 127, 129, 130, 131a, 138, 139, 140, 141, 144, 145, 146, 148, 149, 152, 153.

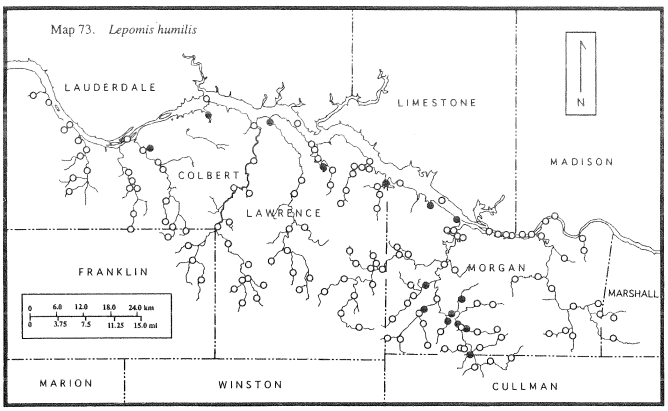
HABITAT: Quiet pools and backwaters of sluggish streams; lakes and ponds. Often near vegetation.



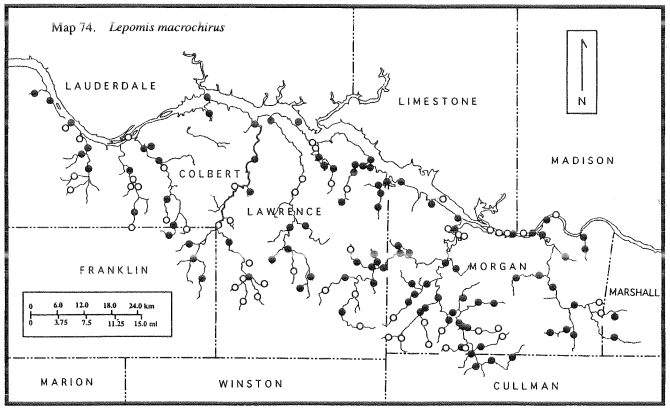
Lepomis humilis (Girard), orangespotted sunfish

DISTRIBUTION: Found in Flint Creek and in the backwaters of the Tennessee River. TVA biologists reported it from Wheeler, Wilson, and Pickwick reservoirs. 18, 27b, 46, 60b, 70a, 75, 77a, 99b, 105, 111a, 113, 114b, 117, 119, 125.

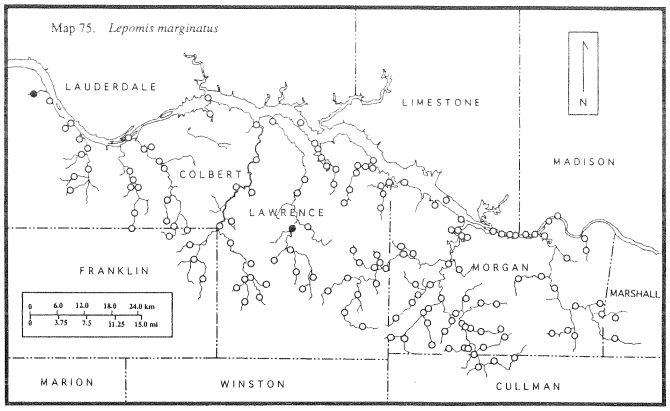
HABITAT: Quiet pools of creeks and small to large, often turbid, rivers; usually near brush.



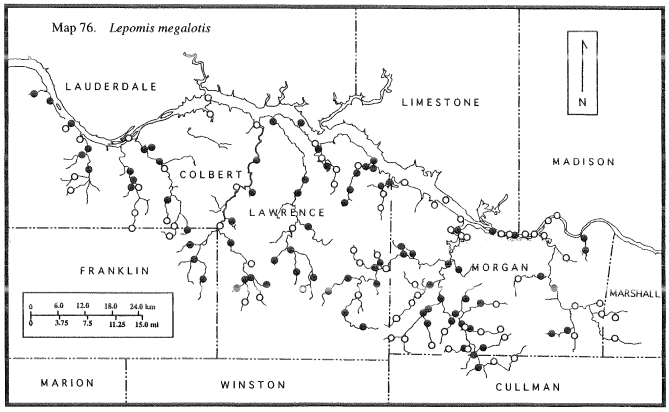
Lepomis macrochirus Rafinesque, bluegill
DISTRIBUTION: Locally abundant, found in all tributaries. 1, 2, 3a, 3d, 3c, 6, 7b, 8, 11, 15, 18, 19, 20a, 22, 24, 25, 27b, 28b, 29, 30, 31, 35, 36, 37, 38, 40, 46, 47, 49, 50, 51, 52, 54, 55, 56a, 59, 60a, 60b, 60c, 61, 63c, 64b, 65, 66, 67, 69, 70a, 71b, 71c, 72, 73, 74, 75, 77a, 78b, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 93, 94, 97, 99a, 99b, 100, 101, 102, 104, 105, 106, 111a, 113, 114a, 114b, 115, 116, 117, 118, 119, 122b, 125, 126, 128, 129, 130, 134, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 148, 149, 150, 152, 153.
HABITAT: Vegetated lakes, ponds, swamps, and pools of creeks and small to large rivers.



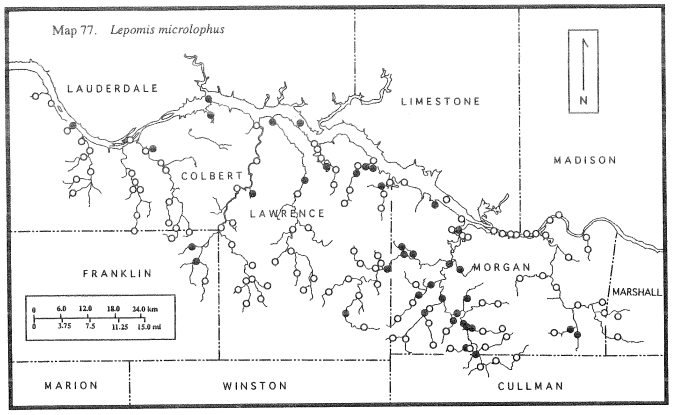
Lepomis marginatus (Holbrook), dollar sunfish
DISTRIBUTION: Found at two localities, taken in Colbert Creek and Muddy Fork of Big Nance Creek. 1, 50.
HABITAT: Sand and mud bottomed, usually brushy, pools of creeks and small to medium rivers; swamps.



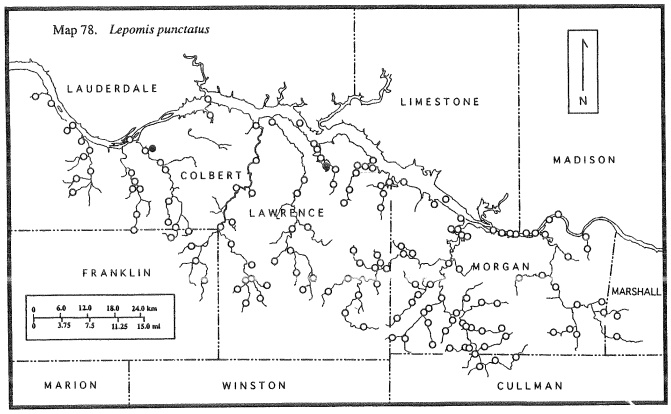
Lepomis megalotis (Rafinesque), Longear sunfish
DISTRIBUTION: Locally abundant, found in all tributaries. 1, 2, 3a, 3c, 3d, 6,7a, 7b, 8, 11, 12, 13, 18, 19, 20a, 22, 24, 26, 30, 31, 33, 35, 36, 37, 38, 40, 41, 43, 44, 46, 47, 48, 49, 51, 52, 53, 54, 56a, 56b, 56c, 58, 60a, 60b, 60c, 63a, 64b ,65 , 67, 68, 69, 70a, 70b, 71b, 71a, 71c, 78b, 82, 83, 84, 85, 86, 88, 90, 93, 94, 95, 97, 98, 99b, 104, 105, 106, 107, 111a, 113, 114a, 114b, 115, 117, 119, 122a, 122b, 125, 126, 128, 131a, 134, 139, 141, 143, 144, 152, 153.
HABITAT: Rocky and sandy pools of head waters, creeks, and small to medium rivers; usually near vegetation.



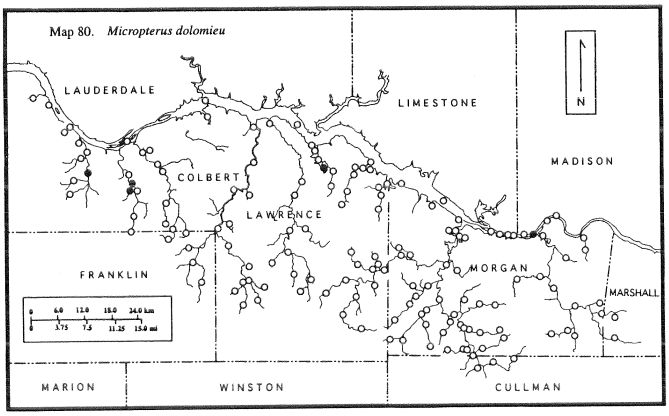
Lepomis microlophus (Günther), redear sunfish
DISTRIBUTION: Found in all tributaries except Cane and Little Bear creeks. 3a, 3c, 3d, 18, 27b, 28b, 31, 35, 36, 46, 47, 56a, 60a, 60b, 64b, 65, 67, 71c, 75, 78b, 82, 83, 84, 85, 86, 97, 99a, 99b, 101, 104, 106, 111a, 113, 114a, 117, 118, 119, 122a, 122b, 125, 142, 143.
HABITAT: Ponds, swamps, lakes; vegetated pools , usually with mud or sand bottoms, of small to medium rivers.



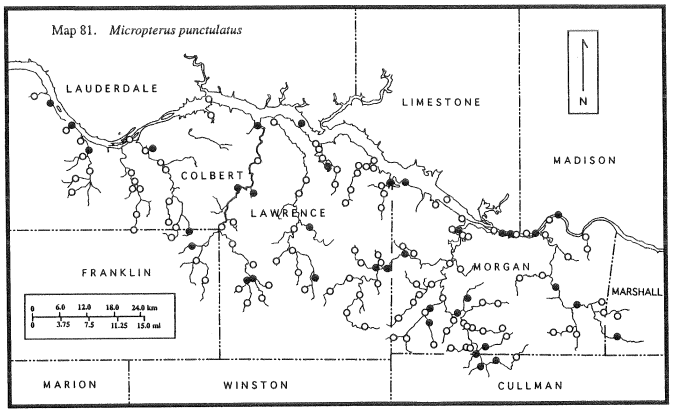
Lepomis punctatus (Valenciennes), spotted sunfish
DISTRIBUTION: It was found only in Spring Creek. 18, 60b.
HABITAT: Heavily vegetated ponds, lakes, pools of creeks and small to medium rivers; swamps.



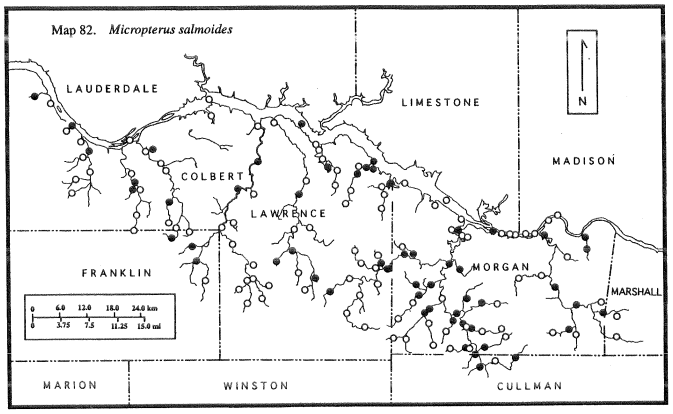
Micropterus dolomieu Lacepede, smallmouth bass
DISTRIBUTION: Found in Cane and Little Bear creeks, Spring Creek embayment and the Tennessee River proper. This probably represents the southernmost extent of its distribution. TVA biologists report it from Wheeler, Wilson, and Pickwick dams. 8, 12, 13, 60a, 136.
HABITAT: Clear, gravel bottomed runs and flowing pools of small to large rivers; shallow rocky areas of lakes.



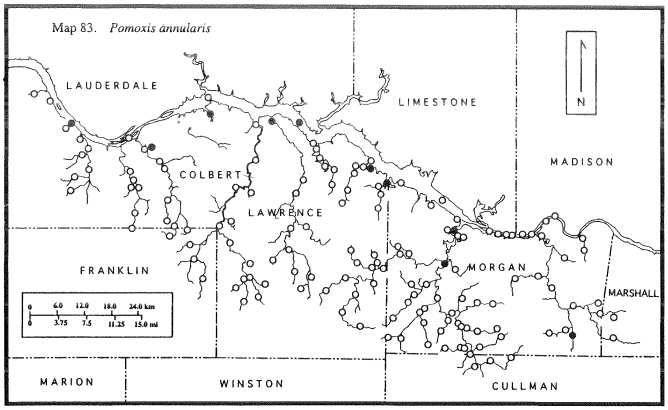
Micropterus punctulatus (Rafinesque), spotted bass
DISTRIBUTION: Found in all tributaries except Little Bear Creek. 2, 3a, 3c, 6, 18a, 26, 29, 31, 32, 35, 40, 43, 49, 54, 56c, 60c, 60d, 70b, 74, 78b, 86, 87, 90, 107, 113, 114a, 125, 126, 128, 129, 132, 133, 136, 141, 145, 149, 151.
HABITAT: Clear, gravelly flowing pools and runs of creeks and small to medium rivers; occupies impoundments in southern part of range.



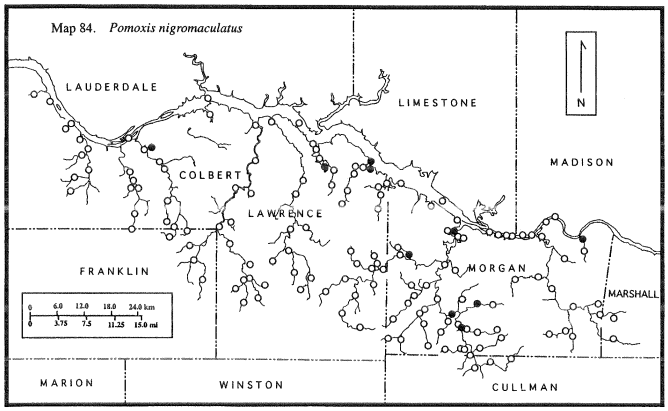
Micropterus salmoides (Lacepede), largemouth bass
DISTRIBUTION: Locally abundant, found in all tributaries. 1, 3a, 3c, 3d, 6, 12, 13, 18, 22, 25, 30, 32, 35, 36, 48, 51, 52, 54, 56a, 60a, 60b, 63c, 64b, 65, 67, 70a, 78b, 82, 83, 84, 86, 87, 88, 95, 99b, 100, 101, 105, 106, 111a, 111b, 113, 114b, 115, 117, 119, 122a, 125, 126, 128, 130, 131a, 137, 141, 143, 145, 147, 152, 153.
HABITAT: Clear, vegetated lakes, ponds, swamps, and backwaters and pools of creeks and small to large rivers; usually over mud or sand; common in impoundments.



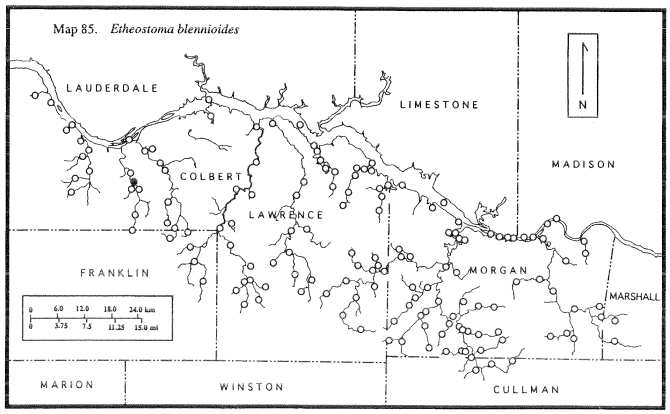
Pomoxis annularis Rafinesque, white crappie
DISTRIBUTION: Found along the Tennessee River and in Flint, Spring, and Cotaco creeks. 3c, 18, 27b, 46, 56a, 64b, 70a, 70b, 78b, 83, 142.
HABITAT: Lakes, ponds, sloughs, backwaters, and pools of streams. Usually among vegetation over mud or sand; most common in clear water.



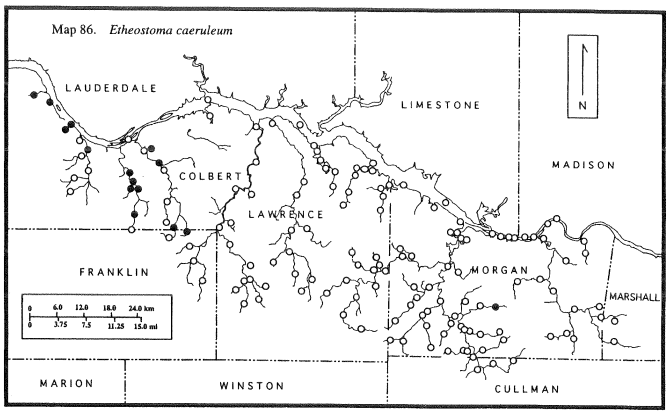
Pomoxis nigromaculatus (Lesueur), black crappie
DISTRIBUTION: Found in Tennessee River, Spring, and Flint creeks. 18, 60b, 63c, 64b, 78b, 84, 113, 115, 118, 152.
HABITAT: Lakes, ponds, sloughs, and backwaters and pools of streams. Usually among vegetation over mud or sand; most common in clear water.



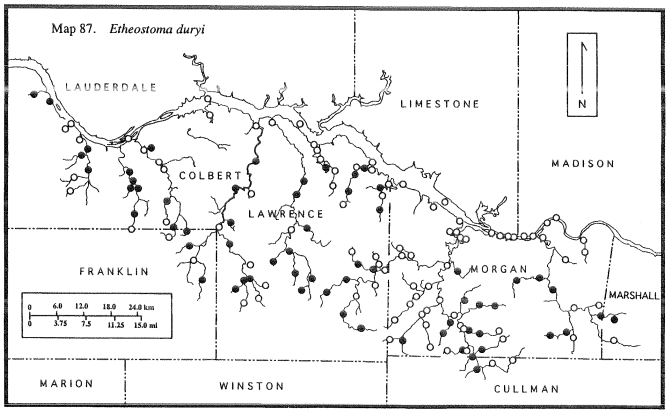
FAMILY PERCIDAE
Etheostoma blennioides Rafinesque, greenside darter
DISTRIBUTION: Present at one locality in Little Bear Creek, this represents a new record for the study area, but Boschung (1992) reported it in major tributaries of the Tennessee River. 12.
HABITAT: Rocky riffles of creeks and small to medium rivers; shores of large lakes.



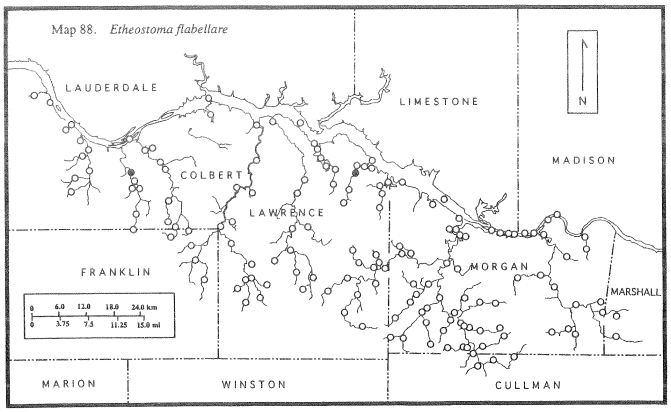
Etheostoma caeruleum Storer, rainbow darter
DISTRIBUTION: Found in Cane, Little Bear, Spring and Flint creeks. 1, 2, 3d, 3e, 4, 6, 11, 12, 13, 14, 15, 18, 20a, 24, 26, 116.
HABITAT: Fast gravel and rubble riffles of creeks and small to medium rivers.



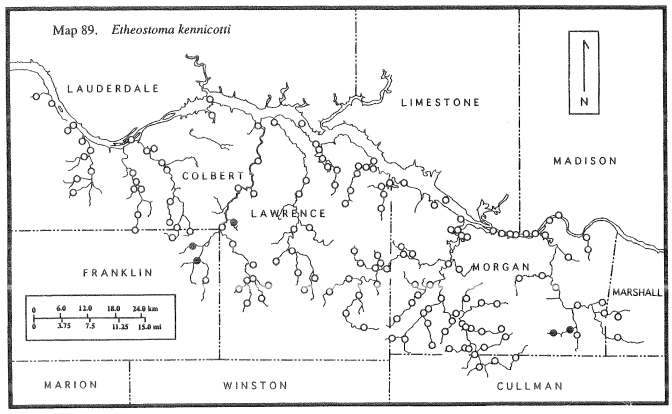
Etheostoma duryi Henshall, blackside snubnose darter
DISTRIBUTION: Locally abundant, found in all tributaries. This probably represents the southernmost extent of its distribution. 1, 2, 6, 7a, 7b, 8, 11, 12, 13, 14, 15, 18, 22, 24, 26, 30, 32, 33, 35, 37, 38, 40, 43, 44, 47, 48, 49, 51, 52, 53, 54, 55, 60b, 65, 67, 68, 71b, 71c, 73, 82, 90, 91, 94, 95, 97, 98, 109, 111b, 112, 114b, 115, 116, 119, 120, 122b, 125, 126, 128, 139, 140, 141, 143, 144, 147, 148.
HABITAT: Rocky pools and adjacent riffles of creeks and small rivers.



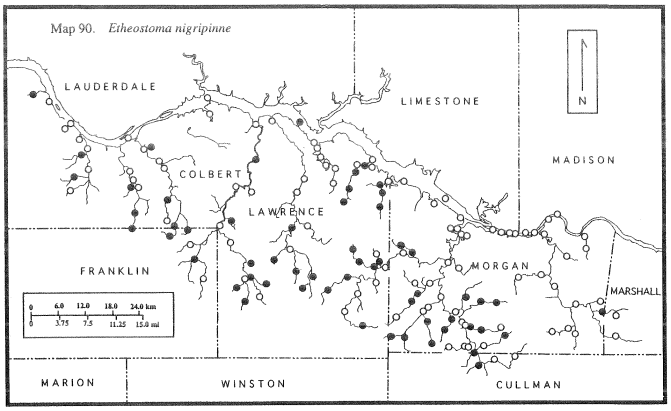
Etheostoma flabellare Rafinesque, fantail darter
DISTRIBUTION: Found in Little Bear and Mallard creeks. This probably represents the southernmost extent of its distribution. 11, 67.
HABITAT: Rocky riffles of creeks and small to medium rivers.



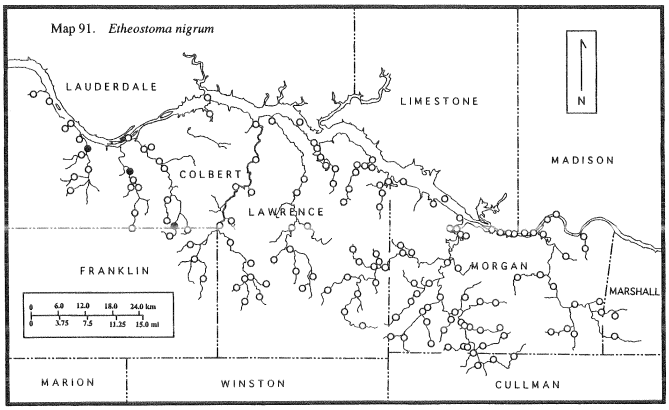
Etheostoma kennicotti (Putnam), stripetail darter
DISTRIBUTION: It was found in Town and Cotaco creeks. 33, 35, 36, 143, 144.
HABITAT: Rocky riffles of creeks and small to medium rivers.



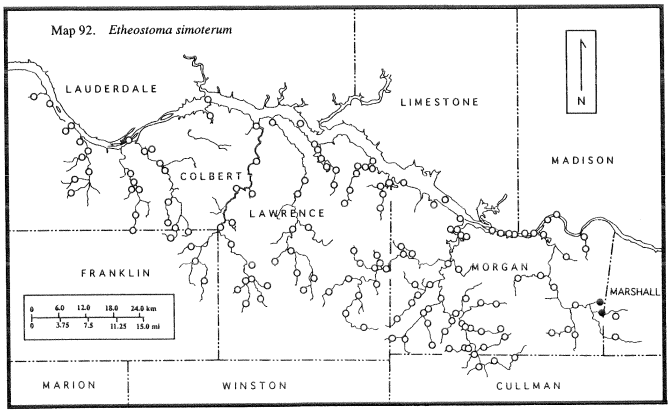
Etheostoma nigripinne Braasch and Mayden, blackfin darter
DISTRIBUTION: Restricted primarily to Highland Rim streams and tributaries of the Tennessee River from the Paint Rock system of northeastern Alabama downstream to Decatur and Perry counties, Tennessee, including the entire Elk River system and much of the Duck River system, but absent from Cypress Creek. It was locally abundant, found in all tributaries. 1, 7a, 7b, 9, 13, 15, 16, 18, 22, 24, 25, 26, 30, 33, 36, 39, 40, 41, 44, 45, 50, 52, 53, 54, 55, 56c, 65, 67, 68, 69, 71b, 71c, 72, 73, 84, 85, 88, 90, 91, 92, 94, 95, 98, 101, 102, 107, 108, 109, 110, 111b, 112, 114b, 115, 116, 119, 120, 125, 127, 128, 147.
HABITAT: Rocky pools and adjacent riffles of head waters, creeks, and small rivers.



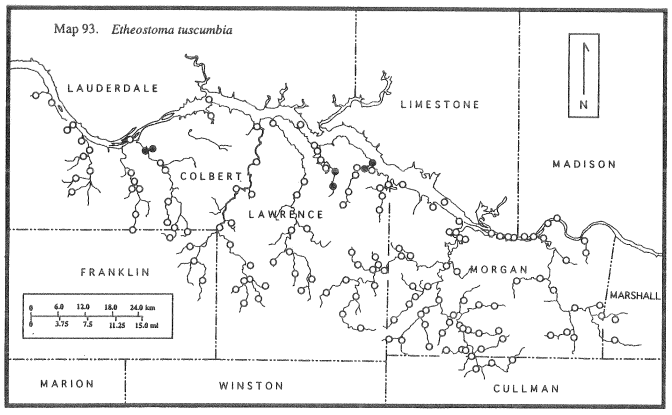
Etheostoma nigrum Rafinesque, Johnny darter
DISTRIBUTION: It was found in Cane, Little Bear, and Spring creeks. 6, 11, 24.
HABITAT: Sandy and muddy, sometimes rocky, pools of head waters, creeks, and small to medium rivers; sandy shores of lakes.



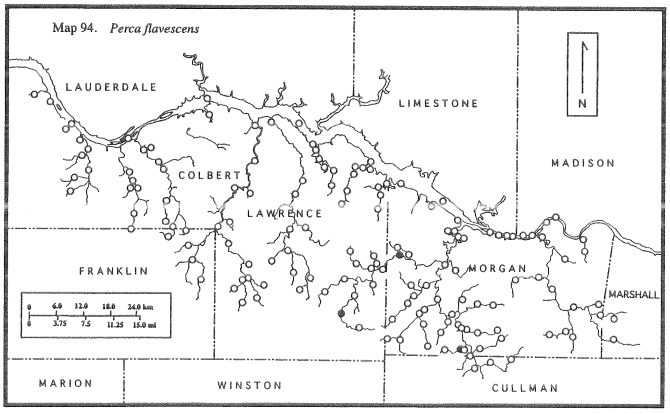
Etheostoma simoterum (Cope), Tennessee snubnose darter
DISTRIBUTION: Taken in Cotaco Creek. 146, 147.
HABITAT: Current swept rocky pools and adjacent riffles of creeks and small to medium rivers.



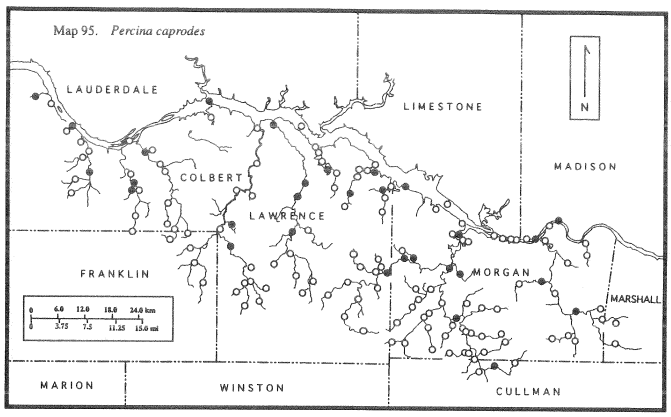
Etheostoma tuscumbia Gilbert and Swain, Tuscumbia darter
DISTRIBUTION: This species was historically known from several localities on the south side of the Tennessee River; presently only known from 2 localities (18-19, and 62). 18, 19, 61, 62, 63c, 65.
HABITAT: Large vegetated springs.



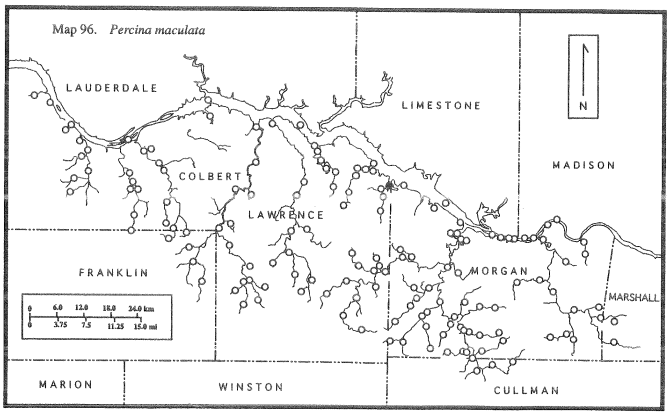
Perca flavescens (Mitchill), yellow perch
DISTRIBUTION: Only found in Flint Creek, a new record for that drainage. A juvenile was found at site 97 over sand with little to no current. TVA biologists have reported it from Wilson and Pickwick reservoirs. 86, 97, 122a.
HABITAT: Lakes, ponds, and pools of creeks and small to large rivers. Most common in clear water near vegetation.



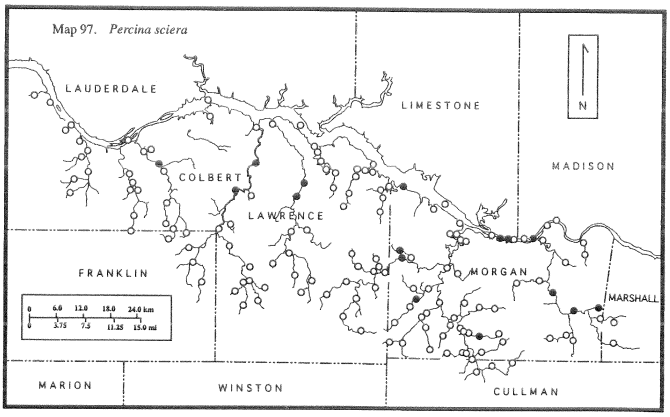
Percina caprodes (Rafinesque), logperch
DISTRIBUTION: Locally abundant, found in all tributaries. 1, 3b, 3c, 8, 12, 13, 19, 28b, 33, 38, 46, 47, 48, 50, 60a, 60b, 64b, 68, 71c, 74, 78b, 82, 83, 84, 86, 87, 113, 129, 136, 139, 145, 151.
HABITAT: Most common over gravel and sand in medium sized rivers but can be found almost anywhere from small, fast flowing rock bottomed streams to vegetated lakes.



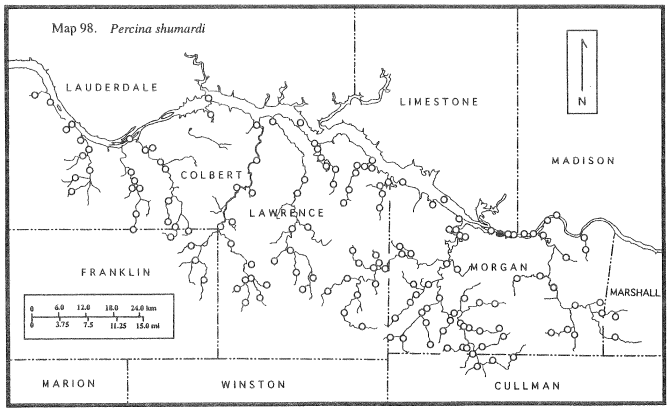
Percina maculata (Girard), blackside darter
DISTRIBUTION: Found at one locality in the study area, a UMMZ collection made by TVA biologists in 1936; also reported from Shoal and Bear Creek systems (Boschung, 1992). 70b.
HABITAT: Pools of creeks and small to medium rivers, usually with moderate current and gravel or sand bottoms.



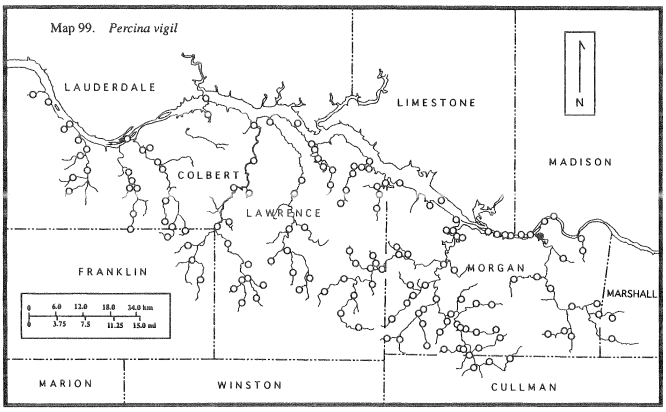
Percina sciera (Swain), dusky darter
DISTRIBUTION: Found in all tributaries except Cane and Little Bear creeks. 20a, 30, 32, 47, 48, 74, 85, 86, 101, 120, 132, 133, 136, 141, 145, 146.
HABITAT: Fast gravel runs, sometimes riffles, of creeks and small to medium rivers. Often near brush.



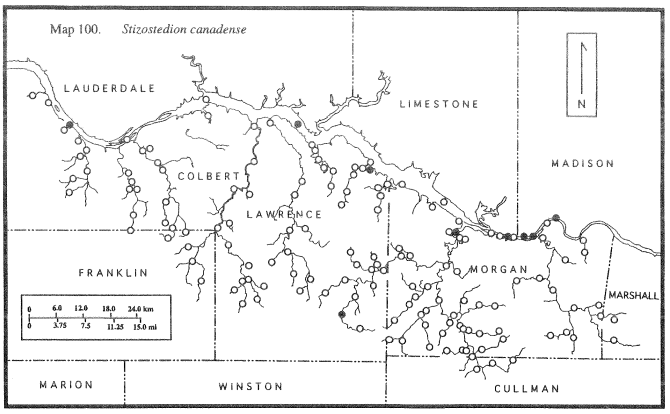
Percina shumardi (Girard), river darter
DISTRIBUTION: It was found in the Tennessee River at one locality, but has been reported from the Paint Rock River, Bear, and Second creeks (Boschung, 1992). 132.
HABITAT: Rocky riffles of small to large rivers. Adults usually in deep swift riffles; young in shallow riffles and runs.



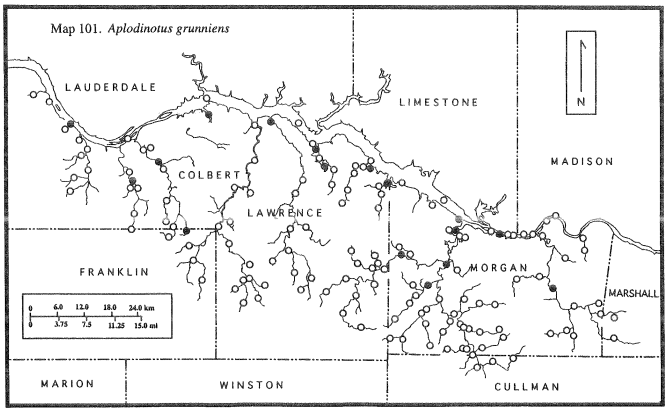
Percina vigil (Hay), saddleback darter
DISTRIBUTION: Locally known only from the mouth of Cotaco Creek, a TVA collection made in 1936. No additional records from the state by Boschung (1992), and only one report by Etnier and Starnes (1993) in the Paint Rock River. 137.
HABITAT: Pools and margins of riffles of small to medium rivers over sand or gravel bottoms; shores of lakes.



Stizostedion canadense (Smith), sauger
DISTRIBUTION: Found in Flint Creek and along the Tennessee River. TVA biologists have reported it from Wheeler, Wilson, and Pickwick reservoirs. 3c, 56a, 64b, 78b, 97, 133, 135, 136, 151.
HABITAT: Sand and gravel runs, sandy and muddy pools and backwaters, of small to large rivers; less often in lakes and impoundments.



FAMILY: SCIAENIDAE
Aplodinotus grunniens Rafinesque, freshwater drum
DISTRIBUTION: Found in Tennessee River, Little Bear, Spring, Flint, and Cotaco creeks. 3c, 12, 20a, 26, 27b, 46, 58, 60a, 64b, 70a, 77a, 78b, 83, 86, 99a, 132, 141.
HABITAT: Bottom of medium to large rivers and lakes.



DISCUSSION

This survey documents the ichthyofauna of a poorly studied area, the southern tributaries of the south bend of the Tennessee River. It also raises questions regarding the historical ichthyofauna of this region, especially given the great fish diversity found in northern tributaries of the Tennessee River. Several species, including *Erimystax dissimilis, E. insignis, Luxilus coccogenis, Lythrurus lirus, Nocomis micropogon, Notropis ariommus, N. photogenis, N. telescopus, Phenacobius uranops, Erimyzon oblongus, Noturus exilis, N. flavus, Etheostoma blennius, E. camurum, E. rufilineatum, E. stigmaeum*, and *E. zonale* are found north of the river but were not documented from the present study, south of the Tennessee River. One question that is raised from this study is, why are there such drastic differences in the ichthyofaunas of two regions that are in close proximity to one another and have similar physiographies?

Exploring the geological histories of these two areas is beyond the scope of this research but may offer some explanation for the differences in the faunas. However

comparisons of past ichthyofaunas to the present one indicates that the diversity in the survey area has decreased through time. Gilbert (1891) sampled five localities in the present survey area and provided a species list and notes on the relative abundance of each species, much like the present study. There were several species found by Gilbert that were not found in the present study. These include: *Luxilus coccogenis, Nocomis leptocephalus, Notropis leuciodus, Phenacobius uranops, Erimyzon sucetta, Moxostoma anisurum, Cottus bairdi, Etheostoma stigmaeum*, and *Etheostoma zonale*. In addition to these species, *Hybopsis amblops, Ambloplites rupestris*, and *Hybognathus nuchalis* were noted as being abundant by Gilbert but were rare or absent in the present study.

Differences in species occurences are also observed for tributaries sampled by Gilbert when compared to recent collections. Several species collected by Gilbert in Big Nance Creek were found to be absent in the current study, in addition to those previously mentioned. These include *Catostomus commersoni, Moxostoma macrolepidotum, Esox americanus, E. niger, Chaenobryttus gulosus, Etheostoma blennioides*, and *Percina maculata*. In Spring Creek, Gilbert recorded *Cyprinella galactura, Hybopsis amblops, Hybognathus nuchalis, Luxilus coccogenis*, and *Percina maculata* from one locality. In the present study, none of these species were found at any locality in Spring Creek.

Certainly there can be some difficulties with such comparisons. First, to my knowledge, no vouchers of the above mentioned species exist for verification. As a result some of the species records (e.g. *Cottus bairdi, Percina maculata, Moxostoma anisurum*) may be confused with other species and represent misidentifications. However, several of the species are very distinctive (e.g. *Esox, Moxostoma, Phenacobius, Catostomus commersoni, Ambloplites rupestris*) and would not be easily confused by a competent ichthyologist. It is possible that some species mentioned above are present in the study area, but because of a sampling bias in the present study were not detected (e.g. *Moxostoma anisurum, M. macrolepidotum*, and *Catostomus commersoni*). Regardless of these difficulties not all of this change in diversity can be attributed to such error. Rather, it is reasonable to infer that there has been a notable decrease in diversity within the study area over the past 100 years, given the above mentioned data. Furthermore, it is likely that more detailed studies would reveal a greater loss of biodiversity not only of fishes but other aquatic organisms as well.

The most obvious reasons for this loss of biodiversity have probably been the impoundment of the Tennessee River, sedimentation, and pollution. Gilbert's study was conducted before any dams were built on the Tennessee River. Cox (1990) and Wallace and Cox (1990) reported several environmental problems for streams within the study area, specifically with Wheeler reservoir and watersheds draining into it. These included fish contaminated with DDT, PCBs and dioxins, and point and non-point source pollution (including crop land erosion, animal waste, municipal and industrial waste water discharges, and a closed landfill). The point and non-point pollution problems probably had the most direct impact on the tributaries and their ichthyofaunas.

There has been considerable research into specific non-point sources within the Wheeler Reservoir watershed by Cox (1990), USDA (1985), and ADEM (1988). Some of the most intensive row-cropping and livestock production in Alabama occurs in the Wheeler Reservoir watershed. The Tennessee River watersheds of north Alabama have been rated the highest priority in the state for potential water quality problems related to sediment (USDA, 1985). Crop land erosion rates are 11% above the state average for Lawrence County and 13% above for Morgan County. Of six counties identified state-wide as having the highest potential for water quality problems related to pesticide runoff, five are in the Wheeler Reservoir watershed, two of which (Morgan and Lawrence) are in the study area (USDA, 1985). Over the past 20 years, ten major fish kills in the Wheeler Reservoir watershed were believed to be caused by agricultural use of pesticides.

Alabama Department of Environmental Management (1988) identified five major tributaries to Wheeler Reservoir as impacted by animal wastes, one of which is Flint Creek. The investigations that led to these findings were the result of the high amount of livestock found within these counties (top 10 in the state in production of livestock). Morgan County was ranked first in the number of dairy cows and ninth in terms of egg production, while Lawrence County is ranked sixth in the number of beef cattle and seventh in egg production. Flint Creek was identified by ADEM (1988) as impacted by pathogens. Lastly, the same report indicated that approximately five miles of an unnamed tributary of Cotaco Creek near Hulaco was impacted by low pH and high metal concentrations from an abandoned coal mine.

One may arrive at some of the same conclusions about the environmental degradation of the study area by looking at species distributions. Although there was no noticeable correlation between distribution patterns and physiographic provinces, these patterns may be related to other factors. One such factor may be environmental disturbances. The distribution of species in Figure 3 may have once been continuous, much like the distributions of the more common species and many species north of the Tennessee River. However, with environmental disturbances over the past 100 years this continuous distribution could have been disrupted, producing two disjunct distributions. This is supported in part by the findings of Gilbert (1891), who found several species that were not found in the present study. He also recorded four species (*Hybopsis amblops, Notropis boops, Esox americanus*, and *Etheostoma blennioides*) from both in and between the disjunct area of Figure 3, whereas this study only found these species restricted to one or both of the disjunct distributions. In addition, Smith (1979) and Trautman (1981) reported that 13 of the 17 fish species sharing the distribution of Figure 3 are known to be sensitive to increased siltation, turbidity, and decreased vegetation and water quality. They found the geographic distribution of these species was altered by these activities. These same problems reported by Smith and

Trautman are well-documented for the area separating the disjunct distribution of Figure 3 and could be contributing to the change in distributions for these species in recent times.

Since little historical data have been documented for the study area, such extrapolations are difficult to validate. However, given the present distribution data, the poor water quality data, and the absence of many different species which are found abundantly north of the Tennessee River, one may find reason to believe that the ichthyofauna of the present study has been altered drastically in less than 100 years. There are other scenarios that could produce the same sort of distributional patterns in the absence of impacts by man, from a unique combination of historical geologic events to a different set of available habitats and/or resources limiting the diversity of species in the study area. However, this study documents dramatic faunal differences between tributaries in the study area and tributaries in the Tennessee River drainage outside the study area. It also suggests that the loss of biodiversity within the survey area is associated with agricultural and industrial activities. Such activities and the detrimental effects that they may have on aquatic ecosystems should be be considered by State and Federal agencies before more of this biodiversity is lost.

ACKNOWLEDGMENTS

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APPENDIX

Locality data, historic and present, for the survey is arranged in the following order: station number, county, stream name, highway or road number if applicable, distance from nearest town or city, coordinates (township(T),. range(R), and section (Sec)), date(s) of collections, university accession number (see methods for abbreviations), and a total species list arranged in phylogenetic order by family and alphabetically within a family (Mayden, 1992). When sample stations occurred relatively close to one another they were assigned the same number, but given different letters.

1) Colbert County, Colbert Creek at Co. Rd. 1, just S of Lane Springs, T3S, R14W, Sec 3NE; 24 April 1966 (UAIC 2004), 9 October 1993 (UAIC 10964).

Campostoma oligolepis, Clinostomus funduloides, Luxilus chrysocephalus, Lythrurus fasciolaris, Semotilus atromaculatus, Hypentelium nigricans, Fundulus olivaceus, Cottus carolinae, Lepomis macrochirus, L. marginatus, L. megalotis, Micropterus salmoides, Etheostoma caeruleum, E. duryi, E. nigripinne, Percina caprodes.

2) Colbert County, Moon Springs Branch, TVA Map 35 SW tributary of Tennessee River, T3S R14; 15 October 1937 (UMMZ TVA 37-615).

Campostoma oligolepis, Cyprinella spiloptera, Cyprinella whipplei, Hybognathus nuchalis, Luxilus chrysocephalus, Notropis atherinoides, Rhinichthys atratulus, Hypentelium nigricans, Cottus carolinae, Lepomis macrochirus, L. megalotis, Micropterus punctulatus, Etheostoma caeruleum, E. duryi.

3a) Colbert County, Mulberry Creek, Pickwick Lake, ca 0.75 mi above mouth near upper end of impounded water, Map 35 SW, T3S, R13W; 27 July 1938 (UMMZ TVA 38-722), No date (UMMZ TVA 38-37).

Campostoma oligolepis, Cyprinella whipplei, Hybognathus nuchalis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales vigilax, Minytrema melanops, Gambusia affinis, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Percina caprodes.

3b) Colbert County, Mulberry Creek, Pickwick Lake, ca 0.25 mi above mouth, Map 35 SW, T3S, R13W, Sec 27; 27 August 1938 (UMMZ TVA 38-730).

Ictiobus niger.

3c) Colbert County, Mulberry Creek, Map 35 SW, Pickwick Lake, ca 0.5 mi above mouth, T3S, R13W, Sec 28; 26 August 1938 (UMMZ TVA 38-731).

Hybognathus nuchalis, Macrhybopsis storeriana, Catostomus commersoni, Ictiobus bubalus, Minytrema melanops, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Pomoxis annularis, Percina caprodes, Stizostedion canadense, Aplodinotus grunniens.

3d) Colbert County, Mulberry Creek at Co. Rd. 27, 1.7 mi NW of Barton, T3S, R13W, Sec 33/34; 9 October 1993 (UAIC 10980).

Campostoma oligolepis, Cyprinella spiloptera, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis atherinoides, Pimephales notatus, P. vigilax, Cottus carolinae, Lepomis macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma caeruleum.

3e) Colbert County, Parker Spring, T3S, R13W, Sec 28; 29 July 1966 (UAIC 1964).

Campostoma oligolepis, Luxilus chrysocephalus, Cottus carolinae, Lepomis cyanellus, Etheostoma caeruleum.

4) Colbert County, A spring of Mulberry Creek, Pickwick Lake, about 0.5 mi from main lake, Map 35 SW, T3S, R13W, Sec 27; 26 August 1938 (UMMZ TVA 38-732).

Campostoma oligolepis, Notropis atherinoides, Pimephales notatus, Semotilus atromaculatus, Cottus carolinae, Lepomis cyanellus, Etheostoma caeruleum.

5) Colbert County, Cane Creek, tributary to Pickwick Lake at mouth of creek, near Colbert steam plant, T3S, R13W, Sec 36; 6 April 1972 (UAIC 4443).

Hiodon tergisus.

6) Colbert County, Cane Creek, 0.25 mi upstream from Hwy 72, T4S, R13W, Sec 12/7; 10 June 1993 (UAIC 10761).

Campostoma oligolepis, Cyprinella spiloptera, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis boops, Pimephales notatus, Hypentelium nigricans, Moxostoma duquesnei, M. erythrurum, Fundulus olivaceus, Labidesthes sicculus, Cottus carolinae, Lepomis macrochirus, L. megalotis, Micropterus punctulatus, M. salmoides, Etheostoma caeruleum, E. duryi, E. nigrum.

7a) Colbert County, Cornelius Creek (tributary to Cane Creek on Colbert Co. Rd. 33, 1 mi N of Redrock, T4S, R13W, Sec 13; 22 September 1963 (UAIC 865).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Moxostoma

erythrurum, Fundulus notatus, F. olivaceus, Lepomis cyanellus, L. megalotis, Etheostoma duryi, E. nigripinne.

7b) Colbert County, Cornelius Creek at Co. Rd. 49, 0.6 mi N of Red Rock, T4S, R13W, Sec 13/14; 9 October 1993 (UAIC 10962).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis boops, Pimephales notatus, Minytrema melanops, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma duryi, E. nigripinne.

8) Colbert County, Cane Creek, 2.25 mi SE of Red Rock on Ted Hester's Farm, T4S, R12W, Sec 31; 10 July 1993 (UAIC 10733)

Cyprinella spiloptera, C. venusta, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis boops, Pimephales notatus, Fundulus olivaceus, Labidesthes sicculus, Lepomis macrochirus, L. megalotis, Micropterus dolomieu, Etheostoma duryi, Percina caprodes.

9) Colbert County, Unnamed Spring and Run 200 m W of Henson Creek on private road, 6.1 air mi S of Barton, T5S, R13W, Sec 3SW; AUM , 9 October 1993 (UAIC 10963).

Phoxinus erythrogaster, Semotilus atromaculatus, Etheostoma nigripinne.

10) Colbert County, Newsome Springs, T5S, R13W, Sec 4; 30 July 1966 (UAIC 1965).

Phoxinus erythrogaster, Semotilus atromaculatus.

11) Colbert County, Little Bear Creek, 5 mi SW of Tuscumbia on Co. Rd. 65, T4S, R12W, Sec 25; 16 March 1994 (UAIC 10985).

Campostoma oligolepis, Cyprinella spiloptera, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis volucellus, Pimephales vigilax, Hypentelium nigricans, Moxostoma duquesnei, M. erythrurum, Fundulus catenatus, F. olivaceus, Labidesthes sicculus, Lepomis macrochirus, L. megalotis, Etheostoma caeruleum, E. duryi, E. flabellare, E. nigrum.

12) Colbert County, Little Bear Creek Co. Rd. 47, 4.75 mi SSW of Tuscumbia, T4S, R11W, Sec 31SW; 10 July 1993 (UAIC 10734)

Campostoma oligolepis, Cyprinella spiloptera, Hybopsis amblops, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis volucellus, Pimephales notatus, Hypentelium nigricans, Moxostoma duquesnei, M. erythrurum, Fundulus catenatus, Cottus carolinae, Lepomis cyanellus, L. megalotis, Micropterus dolomieu, M. salmoides, Etheostoma blennioides, E. caeruleum, E. duryi, Percina caprodes, Aplodinotus grunniens.

13) Colbert County, Smith Creek on Co. Rd. 47, 5 mi SW of Tuscumbia, T5S, R11W, Sec 6; 10 July 1993 (UAIC 10731).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Hypentelium nigricans, Moxostoma duquesnei, Fundulus catenatus, F. olivaceus, Cottus carolinae, Lepomis cyanellus, L. megalotis, Micropterus dolomieu, M. salmoides, Etheostoma caeruleum, E. duryi, E. nigripinne, Percina caprodes.

14) Colbert County, Little Bear Creek, Co. Rd. 36, 3.5 mi NW of Littleville, T5S, R11W, Sec 6/5; 16 March 1994 (UAIC 10984).

Campostoma oligolepis, Luxilus chrysocephalus, Pimephales notatus, Hypentelium nigricans, Cottus carolinae, Etheostoma caeruleum, E. duryi.

15) Colbert County, Cook Creek at Co. Rd. 18, 5 mi N of Russelville, T5S, R11W, Sec 31; 10 July 1993 (UAIC 10735).

Campostoma oligolepis, Cyprinella galactura, Luxilus chrysocephalus, Semotilus atromaculatus, Hypentelium nigricans, Noturus exilis, Fundulus catenatus, Lepomis cyanellus, L. macrochirus, Etheostoma caeruleum, E. duryi, E. nigripinne.

16) Franklin County, Cook Creek at Co. Rd. 58, 3.24 mi N of Russellville, T6S, R11W, Sec 6W; 16 March 1994 (UAIC 10986).

Phoxinus erythrogaster, Rhinichthys atratulus, Semotilus atromaculatus, Etheostoma nigripinne.

17a) Colbert County/Lauderdale, Pickwick Reservoir; 19 August 1983 (AUM 540).

Tilapia mossambica.

17b) Colbert/Lauderdale County, Pickwick Reservoir at 7 mi island, just below Florence (5 mi below Wilson Dam); April 1939 (UMMZ Z200919).

Cycleptus elongatus.

18) Lawrence County, Tuscumbia (Big) Spring (run and pool) in Tuscumbia City Park, just S of downtown, T4S, R11W, Sec 9 NW 1/4; 30 June 1928 (UMMZ HRB 28-12), 10 December 1936 (UMMZ Z114704), 10 December 1936 (UMMZ TVA 36-152), 4 March 1972 (UAIC 4614), October 1976 (AUM 14484-14487), October 1976 (AUM 14388-14399), 17 August 1993 (UAIC 10772), 6 December 1993 (UAIC 10967), 16 March (UAIC 10969), 15 June 1994 (UAIC 10992), 8 September 1994 (UAIC 11002), 21 September 1962 (UAIC 861), 30 July 1964 (UAIC 1351), 2 April 1965 (UAIC 1588), 21 March 1969 (UAIC 3270), 4 March 1972 (UAIC 4614).

Dorosoma cepedianum, D. pentenense, Campostoma oligolepis, Cyprinella spiloptera, Cyprinus carpio, Hemitremia flammea, Luxilus chrysocephalus, Lythrurus fasciolaris, L. fumeus, Notemigonus crysoleucas, Notropis atherinoides, Pimephales notatus, Semotilus atromaculatus, Hypentelium nigricans, Minytrema melanops, Moxostoma duquesnei, Noturus exilis, Esox americanus, E. niger, Aphredoderus sayanus, Fundulus notatus, F. olivaceus, Gambusia affinis, Cottus carolinae, Ambloplites rupestris, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, L. punctatus, Micropterus punctulatus, M. salmoides, Pomoxis annularis, P. nigromaculatus, Etheostoma caeruleum, E. duryi, E. nigripinne, E. tuscumbia.

19) Colbert County, Spring Creek in town of Tuscumbia in

Spring Park just above Big Spring Run, T4S, R11W, Sec 9; October 1976 (AUM 14475-14483), No date (UMMZ Z187512).

Campostoma oligolepis, Luxilus chrysocephalus, Ictalurus punctatus, F. olivaceus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma tuscumbia, Percina caprodes.

20a) Colbert County, Spring Creek at US Hwy 43, 3.1 mi NW of Spring Valley, T4S, R11W, Sec 23; 16 July 1958 (UMMZ CRG 58-9), September 1976 (AUM 14382-14387), 9 October 1993 (UAIC 10979).

Alosa chrysochloris, Campostoma oligolepis, Cyprinella spiloptera, Luxilus chrysocephalus, Lythrurus fasciolaris, L. fumeus, Notropis atherinoides, Opsopoeodus emiliae, Pimephales notatus, Hypentelium nigricans, Moxostoma duquesnei, M. erythrurum, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Lepomis macrochirus, L. megalotis, Etheostoma caeruleum, Percina sciera, Aplodinotus grunniens.

20b) Colbert County, Spring Creek at Hwy 43, 3.4 air mi SE of Tuscumbia, T4S, R11W, Sec 16NE; September 1976 (AUM 14382-14387).

Cyprinella spiloptera, Luxilus chrysocephalus, Pimephales notatus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus.

21) Colbert County, Spring Creek at Tuscumbia, 0.3 mi above Southern R.R. x-ing, T4S, R11W, Sec 26N; October 1976 (AUM 14400-14403).

Lythrurus fumeus, Esox americanus, Aphredoderus sayanus, Gambusia affinis.

22) Colbert County, James Creek at Co. Rd. 78, 2.3 mi SSW of Spring Valley, T5S, R11W, Sec 13NW; October 1976 (AUM 14440-14453), 9 October 1993 (UAIC 10961).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, L. fumeus, Pimephales notatus, Semotilus atromaculatus, Fundulus olivaceus, Lepomis cyanellus, L. macrochirus, L. megalotis, L.cyanellus x L. macrochirus, Micropterus salmoides, Etheostoma duryi, E. nigripinne

23) Colbert County, Rocky Branch, trib. to trib. of Spring Creek at Co. Rd., 1.5 air mi SE of Littleville, T5S, R11W, Sec 35E; October 1976 (AUM 14464-14465).

Semotilus atromaculatus, Lepomis cyanellus.

24) Colbert County, Foxtrap Creek, at Co. Rd. 37, 2.8 mi SE of Littleville, T5S, R10W, Sec 31; October 1976 (AUM 14404-14414), 9 October 1993 (UAIC 10976).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Semotilus atromaculatus, Minytrema melanops, Moxostoma duquesnei, M. erythrurum, Fundulus olivaceus, Lepomis cyanellus, L. macrochirus, L. megalotis , Etheostoma caeruleum, E. duryi, E. nigripinne, E. nigrum.

25) Franklin County, Foxtrap Creek at Co. Rd., trib. to Spring Creek, 2.8 air mi SSE of Littleville, T6S, R11W, Sec 12NW; October 1976 (AUM 14415-14428).

Dorosoma cepedianum, Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Catostomus commersoni, Minytrema melanops, Fundulus olivaceus, Lepomis cyanellus, L. macrochirus, L. cyanellus x L. macrochirus, Micropterus salmoides, Etheostoma nigripinne.

26) Franklin County, Spring Creek, 1.25 mi NW of Saints Crossroads on Co. Rd. 56, T6S, R10W, Sec 4NW; 31 July 1993 (UAIC 10960).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Hypentelium nigricans, Moxostoma duquesnei, M. erythrurum, Lepomis megalotis, Micropterus punctulatus, Etheostoma caeruleum, E. duryi, E. nigripinne, Aplodinotus grunniens.

27a) Colbert County, McKerman Creek, Wilson Lake, ca 1 mi above mouth, Map 44SE, T3S, R10W, Sec 14; 26 July 1938 (UMMZ TVA 38-720).

Alosa chrysochloris, Dorosoma cepedianum.

27b) Colbert County, McKerman Creek, Wilson Lake, Map 44 SE, upper end of impounded water, T3S, R10W, Sec 13; 9 November 1938 (UMMZ TVA 38-769).

Alosa chrysochloris, Dorosoma cepedianum, Hybognathus nuchalis, Macrhybopsis storeriana, Notropis atherinoides, Pimephales vigilax, Ictiobus bubalus, Labidesthes sicculus, Morone mississippiensis, Lepomis humilis, L. macrochirus, L. microlophus, Pomoxis annularis, Aplodinotus grunniens.

28a) Colbert County , Wilson Dam, Tennessee River; 1938 (UMMZ Z103772), 19 July 1937 (CU 1 Z23900).

Anguilla rostrata, Morone chrysops.

28b) Colbert County, Wilson Lake at Shoal Creek station just below mouth of McKerman Creek, on south side of lake; 26 July 1938 (UMMZ Z1222469), 26 July 1938 (UMMZ 122466-68,70; TVA 38-34).

Cyprinella galactura, Labidesthes sicculus, Lepomis macrochirus, Lepomis microlophus, Percina caprodes.

29) Colbert/Lawrence County, Wilson Lake at mouth of Town Creek, Map 53 SW, T3S, R9W, Sec 13; 21 July 1938 (UMMZ TVA 38-717).

Dorosoma cepedianum, Cyprinella spiloptera, Macrhybopsis storeriana, Pimephales vigilax, Ictiobus bubalus, Gambusia affinis, Morone chrysops, Lepomis cyanellus, L. macrochirus, Micropterus punctulatus.

30) Lawrence/Colbert County, Town Creek on Sixth Street, 2 mi NW of Town Creek at Buck Bridge, T4W, R9W, Sec 13/12; 31 July 1993 (UAIC 10879).

Campostoma oligolepis, Cyprinella whipplei, Lythrurus fasciolaris, Notropis atherinoides, Hypentelium nigricans, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides, Etheostoma duryi, E. nigripinne, Percina sciera.

31) Lawrence County, Wolf Creek on Co. Rd., 2.5 mi SW of Town Creek, trib. to Town Creek, T5S, R9W, Sec 2; 12 June 1993 (UAIC 10729).

Cyprinella whipplei, Lythrurus fasciolaris, Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Lepomis macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus.

32) Lawrence County, Town Creek at Cottontown Rd., 2.5 mi WSW of Town Creek, T5S, R9W, Sec 4NW; 31 July 1993 (UAIC 10876).

Cyprinella whipplei, Minytrema melanops, Fundulus olivaceus, Gambusia affinis, Micropterus punctulatus, M. salmoides, Etheostoma duryi, Percina sciera.

33) Lawrence County, Masterson Creek, 4 mi W of Hutton, T5S, R9W, Sec 33W; 31 July 1993 (UAIC 10875).

Campostoma oligolepis, Cyprinella whipplei, Luxilus chrysocephalus, Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. megalotis, Etheostoma duryi, E. kennicotti, E. nigripinne, Percina caprodes.

34) Lawrence County, Town Creek 2 riffles downstream of bridge, 1 mi S of Old Bethel, T6S, R9W, Sec 6N; 12 June 1993 (UAIC 10728).

Campostoma oligolepis, Cyprinella whipplei, Hypentelium nigricans.

35) Franklin County, Little Mud Creek, 1 mi S of Saints Crossroad on Co. Rd., T6S, R10W, Sec 16; 31 July 1993 (UAIC 10805).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Moxostoma erythrurum, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Lepomis macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Etheostoma duryi, E. kennicotti.

36) Franklin County, Smith Creek, 3 mi S of Saints Crossroads, T6S, R10W, Sec 28; 31 July 1993 (UAIC 10803).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Minytrema melanops, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma kennicotti, E. nigripinne.

37) Franklin County, Mud Creek, 1.75 mi SSE of Newburg on private property, T7S, R10W, Sec 10; 12 June 1993 (UAIC 10725).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Semotilus atromaculatus, Catostomus commersoni, Hypentelium nigricans, Fundulus olivaceus, Cottus carolinae, Lepomis macrochirus, L. megalotis, Etheostoma duryi.

38) Lawrence County, Town Creek, Harris Bridge 0.25 mi W of Flatrock, T6S, R9W, Sec 9/16; 12 June 1993 (UAIC 10724).

Campostoma oligolepis, Cyprinella whipplei, Lythrurus fasciolaris, Pimephales notatus, Hypentelium nigricans, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma duryi, Percina caprodes.

39) Lawrence County, Cave Spring off Hwy 101, 2.75 air mi NW of Landersville, T6S, R9W, Sec 25SW; 12 June 1993 (UAIC 10723).

Notemigonus crysoleucas, Pimephales notatus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Etheostoma nigripinne.

40) Lawrence County, Town Creek, 3 mi W of Landersville on Hwy 24, T7S, R9W, Sec 2; 13 June 1993 (UAIC 10726).

Campostoma oligolepis, Cyprinella whipplei, Pimephales notatus, Hypentelium nigricans, Noturus exilis, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus, Etheostoma duryi, E. nigripinne.

41) Lawrence County, Town Creek 1 mi NW of Youngtown, T7S, R8W, Sec 20W; 23 April 1993 (UAIC 10696).

Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. megalotis, Etheostoma nigripinne.

42) Lawrence County, Town Creek at 1.75 mi W of Youngtown and at 1.5 mi SE of Hickory Grove, T7S, R8W, Sec 19-30; 1 December 1971 (UAIC 3863).

Gambusia affinis.

43) Lawrence County, Milam Creek, 3 mi W of Landersville on Hwy 24, T7S, R9W, Sec 2; 13 June 1993 (UAIC 10727).

Campostoma oligolepis, Cyprinella whipplei, Hemitremia flammea, Lythrurus fasciolaris, Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. megalotis, Micropterus punctulatus, Etheostoma duryi.

44) Lawrence County, Rock Spring and Rock Spring Branch, 2.25 mi WNW of Hickory Grove, T7S, R9W, Sec 16E; 23 April 1993 (UAIC 10699).

Hemitremia flammea, Pimephales notatus, Gambusia affinis, Lepomis cyanellus, L. megalotis, Etheostoma duryi, E. nigripinne.

45) Lawrence County, Milam Creek 0.6 mi S of Co. Rd. 17, 1.5 mi SW of Hickory Grove, T7S, R9W, Sec 26W; 23 April 1993 (UAIC 10698).

Luxilus chrysocephalus, Semotilus atromaculatus, Etheostoma nigripinne.

46) Lawrence County, Big Nance Creek, Wilson Lake, Map 53 SW, ca 0.5 mi above mouth seining of oxbow, T3S, R8W, Sec 17; 1 November 1938 (UMMZ TVA-38-767).

Notropis atherinoides, N. buchanani, Pimephales vigilax, Minytrema melanops, Fundulus olivaceus, Gambusia affinis, Lepomis humilis, L. macrochirus, L. megalotis, L. microlophus, Pomoxis annularis, Percina caprodes, Aplodinotus grunniens.

47) Lawrence County, Big Nance Creek, 0.75 mi S of Courtland on Co. Rd. 29 (Jackson St.), T4S, R7W, Sec 31; 14 August 1994 (UAIC 10982).

Campostoma oligolepis, Cyprinella spiloptera, C. whipplei, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis atherinoides, Pimephales notatus, Hypentelium nigricans, Fundulus olivaceus, Labidesthes sicculus,

Lepomis macrochirus, L. megalotis, L. microlophus, Etheostoma duryi, Percina caprodes, P. sciera.

48) Lawrence County, Big Nance Creek off Harmony Rd. near bend in river, 2.75 mi SW of Courtland, T5S, R8W, Sec 2S; 11 July 1993 (UAIC 10736).

Campostoma oligolepis, Cyprinella spiloptera, C. whipplei, Lythrurus fasciolaris, Notemigonus crysoleucas, Hypentelium nigricans, Cottus carolinae, Lepomis megalotis, Micropterus salmoides, Etheostoma duryi, Percina caprodes, P. sciera.

49) Lawrence County, Clear Fork of Big Nance Creek, 1.75 mi NE of Mt. Moriah, T5S, R7W, Sec 31SE; 11 July 1993 (UAIC 10730).

Cyprinella spiloptera, Luxilus chrysocephalus, Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus, Etheostoma duryi.

50) Lawrence County, Muddy Fork Big Nance Creek at Al Hwy 157, T68, R8W, Sec 2; April 18 1972 (CU WMH 72AP18B).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Opsopoeodus emiliae, Pimephales notatus, Hypentelium nigricans, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. marginatus, Etheostoma nigripinne, Percina caprodes.

51) Lawrence County, Muddy Fork of Big Nance Creek, 2 mi SW of Mt. Moriah, T6S, R8W, Sec 15SE; 11 July 1993 (UAIC 10762)

Lepisosteus oculatus, Amia calva, Campostoma oligolepis, Cyprinella whipplei, Pimephales notatus, Ameiurus natalis, Ictalurus punctatus, Gambusia affinis, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides, Etheostoma duryi.

52) Lawrence County, Borden Spring, 2.1 air mi NNE of Landersville, first Co. Rd. downstream of Hwy 24, T6S, R8W, Sec 28W; 23 April 1993 (UAIC 10703).

Lythrurus fasciolaris, Notemigonus crysoleucas, Pimephales notatus, Ameiurus melas, Gambusia affinis, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides, Etheostoma duryi, E. nigripinne.

53) Morgan County, Sledge Creek at Co. Rd. off Al Hwy 24, 2.5 mi WSW of Moulton, T6S, R8W, Sec 36; 23 April 1993 (UAIC 10702).

Lythrurus fasciolaris, Pimephales notatus, Gambusia affinis, Lepomis cyanellus, L. megalotis, Etheostoma duryi, E. nigripinne.

54) Lawrence County, Crow Branch behind Lawrence Co. High School at bridge off Hwy 24 within Moulton City limits, T6S, R7W, Sec 32; 23 April 1993 (UAIC 10694).

Notemigonus crysoleucas, Pimephales notatus, Ameiurus melas, A. natalis, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus, M. salmoides, Etheostoma duryi, E. nigripinne.

55) Lawrence County, Almon Branch, 1.5 air mi W of Wren, T7S, R7W, Sec 18SW; 24 April 1993 (UAIC 10695).

Cyprinella whipplei, Pimephales notatus, Fundulus olivaceus, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. cyanellus x L. microlophus, Etheostoma duryi, E. nigripinne.

56a) Lawrence/Morgan County, Wheeler Reservoir, T3-5S, R4-8W; 6 July 1938 (UMMZ Z122913), 6 July 1938 (UMMZ TVA 38-706), 12 July 1938 (UMMZ TVA 38-710), 20 July 1938 (UMMZ 122435-37 TVA 38-716), 4 October 1938 (UMMZ TVA 38-750).

Lepisosteus oculatus, L. osseus, Hiodon alosoides, Hybognathus hayi, Macrhybopsis storeriana, Carpiodes cyprinus, Ictiobus bubalus, Lepomis macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Pomoxis annularis, Stizostedion canadense.

56b) Morgan County, Wheeler Lake at Byrds Island, Decatur, TVA map 61 NE, T4S, R5W, Sec 34; 12 August 1938 (UMMZ TVA 38-727).

Alosa chrysochloris, Dorosoma cepedianum, Hybognathus nuchalis, Macrhybopsis storeriana, Notropis atherinoides, Carpiodes cyprinus, Ictiobus bubalus, I. niger, Esox niger, Gambusia affinis, Lepomis megalotis.

56c) Morgan County, bridge of Tennessee River Just W of Decatur; 1 July 1928 (UMMZ HRB 28-13).

Campostoma oligolepis, Hemitremia flammea, Lythrurus fasciolaris, Luxilus chrysocephalus, Notropis atherinoides, Pimephales notatus, Semotilus atromaculatus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. megalotis, Micropterus punctulatus, Etheostoma nigripinne.

56d) Morgan County, Tennessee River at Decatur; April 1940 (UMMZ Z200907, Z200908, Z200921 1939).

Acipenser fulvescens, Scaphirhynchus platorynchus, Ictalurus punctatus.

57) Lawrence County, Impounded slough, near mouth of Spring Creek, in Tennessee River, T3S, R7W, Sec 32; 31 July 1936 (UMMZ TVA 36-48).

Ictiobus bubalus, Ameiurus melas, Gambusia affinis.

58) Lawrence County, Spring Creek at Co. Rd. 48 (highway bridge), T4S, R7W, Sec 4/5; 1936 (UMMZ Z114992), no date (UMMZ TVA 36-24), no date (UMMZ Z114993, Z114997, Z114999, Z115001, Z115002, Z115003).

Lepisosteus oculatus, Hiodon alosoides, Dorosoma cepedianum, Cyprinus carpio, Phoxinus erythrogaster, Ictiobus bubalus, I. niger, Minytrema melanops, Ictalurus punctatus, Esox niger, Lepomis megalotis, Aplodinotus grunniens.

59) Lawrence County, Big Herd Spring, 4 mi S of the mouth of Spring Creek, Tennessee River drainage, T4S, R7W, Sec 16; 6 August 1936 (UMMZ TVA 36-38).

Campostoma oligolepis, Moxostoma erythrurum, Ameiurus natalis, Lepomis cyanellus, L. macrochirus.

60a) Lawrence County, Spring Creek embayment, 15 1000 ft. runs along banks between Co. Rd. 48 and Co. Rd. 32. T4S, R7W, Sec 4,5,8,9,16; 15 August 1994 (EBJ 94-99).

Ichthyomyzon castaneus, Lepisosteus oculatus, L.

osseus, Alosa chrysochloris, Dorosoma cepedianum, D. petenense, Cyprinella whipplei, Cyprinus carpio, Notropis atherinoides, Ictiobus bubalus, Minytrema melanops, Ictalurus punctatus, Lepomis macrochirus, L. megalotis, L. microlophus, Micropterus dolomieu, M. salmoides, Percina caprodes, Aplodinotus grunniens.

60b) Lawrence County, Spring Creek, Wheeler Reservoir, between highway and reservoir, Map 68 NW, T2-3S, R7W, Sec 32-34, 4-5; 28 September 1938 (UMMZ TVA 38-745).

Alosa chrysochloris, Campostoma oligolepis, Hybognathus hayi, Luxilus chrysocephalus, Notemigonus crysoleucas, Opsopoeodus emiliae, Pimephales notatus, P. vigilax, Hypentelium nigricans, Minytrema melanops, Ameiurus nebulosus, Esox niger, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, L. punctatus, Micropterus salmoides, Pomoxis nigromaculatus, Etheostoma duryi, Percina caprodes,.

60c) Lawrence County, mouth of Spring Creek, T3S, R7W, Sec 30; 30 July 1936 (UMMZ TVA 36-92).

Cyprinella spiloptera, Pimephales notatus, P. vigilax, Moxostoma erythrurum, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus,.

60d) Lawrence County, Spring Creek, tributary to Tennessee River, T4S, R7W, Sec 4; 30 July 1936 (UMMZ TVA 36-68).

Dorosoma cepedianum, Notropis atherinoides, Opsopoeodus emiliae, Ictiobus bubalus, Micropterus punctulatus.

61) Lawrence County, Wheeler Branch, tributary to Spring Creek, T4S, R7W, Sec 23; 10 March 1976 (UAIC 5068).

Dorosoma cepedianum, Campostoma oligolepis, Cyprinella galactura, Hemitremia flammea, Notemigonus crysoleucas, Notropis rubellus, Pimephales notatus, P. vigilax, Minytrema melanops, Ameiurus melas, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Etheostoma tuscumbia.

62) Lawrence County, Wheeler Spring at Al/US Hwy 20/72 Alt at Wheeler, just W of Co. Rd. 377. T4S, R7W, Sec 34 SE1/4; April 17 1969 (CU 8, 21 WMH 69APR 17), 4 March 1972 (UAIC 4615), 13 February 1992 (UAIC 4616), 3 April 1965 (UAIC 1592), 6 May 1993 (UAIC 10691), 17 August 1993 (UAIC 10778), 6 December 1993 (UAIC 10920), 15 March 1994 (UAIC 10970), 15 June 1994 (UAIC 10987), 8 September 1994 (UAIC 11000).

Campostoma oligolepis, Hemitremia flammea, Pimephales notatus, Semotilus atromaculatus, Gambusia affinis, Lepomis cyanellus, Etheostoma tuscumbia.

63a) Lawrence County, Malletts (believed to be Mallard) Creek, 1 mi from mouth of the Tennessee River, T4S, R6W, Sec 15; 28 July 1936 (UMMZ TVA 36-39).

Lythrurus fasciolaris, Gambusia affinis, Lepomis megalotis.

63b) Lawrence County, Mallets (believed to be Mallard) Creek, 2 mi from Tennessee River, T4S, R6W, Sec 15; 28 July 1936 (UMMZ TVA 36-74).

Lythrurus fasciolaris.

63c) Lawrence County, Impounded pond near mouth of Malletts (believed to be Mallard) Creek, T4S, R6W, Sec 10; 28 July 1936 (UMMZ TVA 36-86).

Cyprinella spiloptera, Hybognathus hayi, H. nuchalis, Notemigonus crysoleucas, Pimephales notatus, Ictiobus bubalus, I. cyprinellus, I. niger, Ameiurus melas, A. natalis, A. nebulosus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. macrochirus, Micropterus salmoides, Pomoxis nigromaculatus, Etheostoma tuscumbia.

64a) Lawrence County, Malletts (believed to be Mallard) Creek, at (Co. Rd. 48) bridge, tributary Tennessee River, T4S, R6W, Sec 21; 28 July 1936 (UMMZ TVA 36-21).

Cyprinella spiloptera, Lythrurus fasciolaris, Hypentelium nigricans, Gambusia affinis.

64b) Lawrence County, Mallard Creek embayment, 15 1000 ft. runs along banks between Tennessee River and mouth of Mallard Creek, T4S, R6W; 17 August 1994.

Lepisosteus oculatus, L. osseus, L. platostomus, Amia calva, Alosa chrysochloris, Dorosoma cepedianum, D. petenense, Cyprinus carpio, Notemigonus crysoleucas, Notropis atherinoides, Ictiobus bubalus, Minytrema melanops, Fundulus notatus, Labidesthes sicculus, Morone chrysops, M. mississippiensis, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Pomoxis annularis, P. nigromaculatus, Percina caprodes, Stizostedion canadense, Aplodinotus grunniens.

65) Morgan County, Mallard Creek, Wheeler Reservoir, just above impounded water, Map 61 NW, T4S, R6W, Sec 20; 10 October 1938 (UMMZ TVA 38-755), 23 November 1938 (UMMZ 122900-122898 TVA 38-140), 23 November 1938 (UMMZ TVA38-775), 23 November 1938 (UMMZ Z122905).

Minytrema melanops, Gambusia affinis, Labidesthes sicculus, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma duryi, E. nigripinne, E. tuscumbia.

66) Lawrence County, Big Herd Spring, 4 mi S of the mouth of Spring Creek, Tennessee River drainage, T4S, R7W, Sec 16; 6 August 1936 (UMMZ TVA 36-38).

Campostoma oligolepis, Moxostoma erythrurum, Ameiurus natalis, Lepomis cyanellus, L. macrochirus.

67) Lawrence County, Mallard Creek at unnumbered Co. Rd., 2.5 mi N of Hillsboro, T4S, R6W, Sec 20/29; 4 August 1994 (TVA 1205-R).

Amia calva, Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Ameiurus natalis, Fundulus notatus, Gambusia affinis, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma duryi, E. flabellare, E. nigripinne.

68) Lawrence County, Mallard Creek at Al Hwy 20 (US Hwy alt 72), ca 0.2 mi E of Lovettville, T4S, R6W, Sec 31; 6 December 1980 (UAIC 7815).

Campostoma oligolepis, Hemitremia flammea, Lythrurus fasciolaris, Pimephales notatus, Gambusia affinis, Lepomis cyanellus, L. megalotis, L. cyanellus x L. microlophus, Etheostoma duryi, E. nigripinne, Percina caprodes.

69) Lawrence County, Mallard Creek, T5S, R6W Sec 7; 11 March 1976 (UAIC 5067).

Hemitremia flammea, Luxilus chrysocephalus, Notemigonus crysoleucas, Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Lepomis cyanellus, L. macrochirus, L.megalotis, Etheostoma nigripinne,

70a) Lawrence County, Wheeler Reservoir at mouth of Fox and Trinity Creeks, Map 61 NE, T4S, R6W, Sec 36; 28 July 1936 (UMMZ TVA 36-75), 6 September 1938 (UMMZ TVA 38-753), 6 October 1939 (UMMZ TVA 39-753).

Alosa chrysochloris, Dorosoma cepedianum, Cyprinella spiloptera, Macrhybopsis storeriana, Notemigonus crysoleucas, Notropis atherinoides, Opsopoeodus emiliae, Pimephales notatus, P. vigilax, Ictiobus bubalus, Moxostoma breviceps, M. erythrurum, Gambusia affinis, Labidesthes sicculus, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, Micropterus salmoides, Pomoxis annularis, Aplodinotus grunniens.

70b) Lawrence County, mouth of Fox Creek, in Tennessee River, T4S, R5SW, Sec 30; 27 July 1936 (UMMZ TVA 36-44).

Dorosoma cepedianum, Cyprinella spiloptera, Luxilus chrysocephalus, Macrhybopsis storeriana, Pimephales vigilax, Gambusia affinis, Lepomis megalotis, Micropterus punctulatus, Pomoxis annularis, Percina maculata.

71a) Lawrence County, Goose Pond Branch near Hwy 20, tributary of Fox Creek, T5S, R6W, Sec 1; 25 August 1936 (UMMZ TVA 36-114).

Campostoma oligolepis, Moxostoma duquesnei, Lepomis megalotis.

71b) Lawrence County, Fox Creek, Goose Pond Branch, T4S, R6W, Sec 35; 6 December 1980 (UAIC 7813).

Cyprinella spiloptera, Notemigonus crysoleucas, Notropis atherinoides, Fundulus notatus, Gambusia affinis, Labidesthes sicculus, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma duryi, E. nigripinne.

71c) Lawrence County, Goose Pond Branch, trib. to Fox Creek, ca 0.3 mi NE of Fish Pond, T5S, R6W, Sec 2; 6 December 1980 (UAIC 7812).

Campostoma oligolepis, Minytrema melanops, Fundulus notatus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Etheostoma duryi, E. nigripinne, Percina caprodes.

72) Lawrence County, Fox Creek at alt. US Hwy 20, T5S, R6W, Sec 2; 6 December 1980 (UAIC 7811).

Campostoma oligolepis, Luxilus chrysocephalus, Pimephales notatus, Semotilus atromaculatus, Fundulus notatus, F. olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Etheostoma nigripinne.

73) Lawrence County, Fox Creek, T5S, R6W, Sec 14; 6 December 1980 (UAIC 7814).

Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Etheostoma duryi, E. nigripinne.

74) Morgan County, Tennessee River at Pecks Landing, 1 mi E of mouth of Fox Creek and Trinity Branch, T4S R5W, Sec 33; 27 July 1936 (UMMZ TVA 36-34)

Dorosoma cepedianum, Macrhybopsis storeriana, Notropis atherinoides, Pimephales notatus, Lepomis macrochirus, Micropterus punctulatus, Percina caprodes, P. sciera.

75) Morgan County, Dry branch of Decatur, Wheeler Reservoir, Map 68 SW, in impounded water, T5S, R4W, Sec 18; 4 October 1938 (UMMZ TVA 38-751).

Cyprinella spiloptera, Notemigonus crysoleucas, Gambusia affinis, Labidesthes sicculus, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L.macrochirus, L. microlophus.

76) Morgan County, Wheeler Reservoir out from Decatur Harbor; May 1949 (AUM 3001).

Morone mississippiensis.

77a) Morgan County, backwaters of Flint Creek, near power lines, Wheeler Reservoir, about 5 mi above Decatur, Map 68 SW, T5S, R4W, Sec 23; 19 September 1938 (UMMZ TVA 38-742).

Macrhybopsis storeriana, Notropis atherinoides, Ictalurus punctatus, Labidesthes sicculus, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, Aplodinotus grunniens.

77b) Morgan County, 0.5 air mi N of Pt. Mallard Park, Wheeler Lake, T5S, R4W, Sec ; 5 September 1976 (UAIC 5340).

Fundulus notatus.

78a) Morgan County, Flint Creek, Wheeler Lake, ca. 0.5 mi from lake, Map 68 SW/NW, T5S, R4W, Sec 35; 10 September 1938 (UMMZ TVA 38-738), 10 October 1938 (UMMZ Z122934).

Lepisosteus oculatus, Carpiodes cyprinus, Ictiobus niger, Moxostoma duquesnei.

78b) Morgan County, Flint Creek embayment, 15 1000 ft. shocking runs along banks from Tennessee River to Hwy 67 bridge, T5-6S, R4W; 16 August 1994 (UAIC).

Lepisosteus oculatus, L. osseus, Alosa chrysochloris, Dorosoma cepedianum, D. petenense, Cyprinus carpio, Notropis atherinoides, Ictiobus bubalus, Minytrema melanops, Moxostoma erythrurum, Morone chrysops, M. mississippiensis, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Pomoxis annularis, P. nigromaculatus, Percina caprodes,

Stizostedion canadense, Aplodinotus grunniens.

79) Morgan County, Brush Creek, tributary to Flint River, near Valley Club, Decatur, T5S, R4W, Sec 33; 1 July 1936 (UMMZ TVA 36-65).

Ictiobus bubalus, Ameiurus melas, A. nebulosus

80) Morgan County, Spring Branch (0.25 mi below a spring), near Flint Creek bridge, Somerville Road, tributary of Flint Creek, T6S, T4W, Sec 2; 8 July 1936 (UMMZ TVA 36-90).

Cyprinella spiloptera, C. whipplei, Notropis atherinoides, Lepomis hybrid.

81) Morgan County, Flint Creek, Wheeler Lake, just above state highway at Sandlins store, T6S, R4W, Sec 11; 15 September 1938 (UMMZ TVA 38-740).

Ictiobus cyprinellus.

82) Morgan County, Village Branch at unnumbered Co. Rd., 2.5 mi N of Hartselle, T6S, R4W, Sec 34; 2 June 1994 (TVA 1019).

Amia calva, Lythrurus fasciolaris, Pimephales notatus, Minytrema melanops, Ameiurus melas, A. natalis, Gambusia affinis, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma duryi, Percina caprodes.

83) Morgan County, Flint Creek at Hwy 31 public boat ramp, 3.5 mi NNW of Hartselle, T6S, R4W, Sec 28/29; 14 June 1994 (TVA 1001-12).

Lepisosteus oculatus, L. osseus, Alosa chrysochloris, Dorosoma cepedianum, D. pentenense, Cyprinus carpio, Pimephales notatus, Ictiobus bubalus, I. cyprinellus, I. niger, Minytrema melanops, Moxostoma erythrurum, Fundulus notatus, Labidesthes sicculus, Lepomis macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Pomoxis annularis, Percina caprodes, Aplodinotus grunniens.

84) Morgan County, Mud Tavern Creek on unnumbered Co. Rd., 2 mi W of Basham, T6S, R5W, Sec 22; 1 June 1994 (TVA 1014).

Cyprinella spiloptera, C. whipplei, Minytrema melanops, Ameiurus natalis, Fundulus olivaceus, Gambusia affinis, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Pomoxis nigromaculatus, Etheostoma nigripinne, Percina caprodes,

85) Morgan County, Mud Tavern Creek at Co. Rd. 61, 5.5 mi S of Trinity, T6S, R5W, Sec 17N; 25 September 1993 (UAIC 10974).

Cyprinella whipplei, Lythrurus fasciolaris, Notemigonus crysoleucas, Opsopoeodus emiliae, Pimephales notatus, Minytrema melanops, Ameiurus melas, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Lepomis macrochirus, L. megalotis, L. microlophus, Etheostoma nigripinne, Percina sciera.

86) Morgan County, West Flint Creek, unnumbered Co. Rd. 3.5 mi NNW of Neel, T6S, R5W, Sec 20; 15 June 1994 (TVA 1002-13).

Dorosoma cepedianum, Cyprinella spiloptera, Cyprinus carpio, Notropis atherinoides, Pimephales notatus, Hypentelium nigricans, Minytrema melanops, Moxostoma erythrurum, Pylodictis olivaris, Fundulus olivaceus, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Perca flavescens, Percina caprodes, P. sciera, Aplodinotus grunniens.

87) Lawrence County, West Flint Creek, 1.25 mi NW of Pumpkin Center at Stover Bridge, Co. Rd. 59. T6S, R6W, Sec 36; 25 September 1993 (UAIC 10973).

Campostoma oligolepis, Cyprinella spiloptera, C. whipplei, Pimephales notatus, Hypentelium nigricans, Fundulus notatus, F. olivaceus, Gambusia affinis, Labidesthes sicculus, Cottus carolinae, Lepomis cyanellus, L. macrochirus, L. microlophus, Micropterus punctulatus, M. salmoides, Percina caprodes.

88) Lawrence County, Flat Creek at Co. Rd. 61, 2 mi NE of Five Points, T6S, R6W, Sec 26; 18 May 1994 (TVA 1015).

Lepisosteus oculatus, Amia calva, Minytrema melanops, Ameiurus melas, A. natalis, Fundulus olivaceus, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides, Etheostoma nigripinne.

89) Lawrence County, Flat Creek 4 mi S of Caddo on Co. Rd. 28, T6S, R6W, Sec 23; 25 September 1993 (UAIC 10839).

Fundulus olivaceus, Cottus carolinae, Lepomis macrochirus.

90) Lawrence County, Big Shoal Creek, 1 mi NE of Five Points on Co. Rd. 61, T6S, R6W, Sec 34 NE; 10 April 1993 (UAIC 10701), 14 August 1994 (UAIC 10977), 17 May 1994 (TVA 1016).

Campostoma oligolepis, Cyprinella whipplei, Lythrurus fasciolaris, Opsopoeodus emiliae, Pimephales notatus, Hypentelium nigricans, Fundulus notatus, F. olivaceus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus, Etheostoma duryi, E. nigripinne.

91) Lawrence County, Big Shoal Creek, 2 mi NNE of Fairfield on unnumbered Co. Rd., off Co. Rd. 28, T6S, R6W, Sec 29; 14 August 1994 (UAIC 10983).

Lythrurus fasciolaris, Pimephales notatus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Etheostoma duryi, E. nigripinne.

92) Lawrence County, Flat Creek at Co. Rd., tributary to West Flint Creek, 4.5 mi NE of Five Points. 78 , T6S, R6W, Sec 3; 28 July 1964 (UAIC 1337).

Campostoma oligolepis, Lythrurus fasciolaris, Luxilus chrysocephalus, Pimephales, notatus, Semotilus atromaculatus, Etheostoma nigripinne.

93) Lawrence County, McDaniel Creek at unnumbered Co. Rd. 2.5 mi NE of Speake, T7S, R6W, Sec 10/11; 18 May 1994 (TVA 1017).

Cyprinus carpio, Luxilus chrysocephalus, Lythrurus

fasciolaris, Notropis atherinoides, Pimephales notatus, P. vigilax, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis.

94) Lawrence County, Elam Creek at unnumbered Co. Rd., 4.5 mi NW of Speake, T7S, R7/6W, Sec 1/6; 18 May 1994 (TVA 1018).

Lepisosteus oculatus, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis atherinoides, Pimephales notatus, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. macrochirus, L. megalotis, Etheostoma duryi, Etheostoma nigripinne.

95) Lawrence County, Elam Creek, Co. Rd. S of Hwy 157 at ford upstream from bridge, T7S, R7W, Sec 10SE; 12 June 1993 (UAIC 10713).

Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Gambusia affinis, Lepomis cyanellus, Lepomis megalotis, Lepomis cyanellus x L. ?, Micropterus, salmoides, Etheostoma duryi, Etheostoma nigripinne.

96) Lawrence County, West Flint Creek Hwy 157, 1.5 mi NW of Five Points, T7S, R6W, Sec 20; 25 September 1993 (UAIC 10843).

Cyprinus carpio, Lythrurus fasciolaris.

97) Lawrence County, West Flint Creek, 3 air mi WSW of Speake on Co. Rd. 86, T7S, R7W, Sec 36E; 12 June 1993 (UAIC 10722).

Cyprinella spiloptera, Luxilus chrysocephalus, Lythrurus fasciolaris, Opsopoeodus emiliae, Pimephales notatus, Minytrema melanops, Moxostoma erythrurum, Cottus carolinae, Lepomis macrochirus, L. megalotis, L. microlophus, Etheostoma duryi, Perca flavescens, Stizostedion canadense.

98) Lawrence County, West Flint Creek on unnumbered Co. Rd., 4 mi SSW of Speake, T8S, R6W, Sec 9W; 14 August 1994 (UAIC 10981).

Clinostomus funduloides, Cyprinella spiloptera, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Semotilus atromaculatus, Fundulus olivaceus, Lepomis megalotis, Etheostoma duryi, E. nigripinne.

99a) Morgan County, Chapel Creek, 1.6 mi NW of Hwy 36 (on Iron Man Rd.) 2.4 mi SE of Neel, T7S, R5W, Sec 12; 16 June 1984 (UAIC 7837).

Semotilus atromaculatus, Moxostoma sp., Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. macrochirus, L. microlophus, Aplodinotus grunniens.

99b) Morgan County, No Business Creek at Co. Rd. 22, 2.4 mi SE of Neel, T7S, R5W Sec 11; 1 June 1994 (TVA 1003).

Dorosoma cepedianum, Opsopoeodus emiliae, Pimephales notatus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides.

100) Morgan County, Neel Creek on unimproved gravel road, ca. 1.8 mi SE of Neel, T7S, R5W, Sec 10; 16 June 1984 (UAIC 7838).

Dorosoma cepedianum, Notemigonus crysoleucas, Ameiurus melas, Fundulus notatus, Gambusia affinis, Labidesthes sicculus, Chaenobryttus gulosus ,Lepomis cyanellus, L. macrochirus, L. cyanellus x L.?, Micropterus salmoides.

101) Morgan County, Chapel Creek, tributary to Flint Creek, T7S, R5W, Sec 15; 9 April 1976 (UAIC 5107).

Dorosoma cepedianum, Opsopoeodus emiliae, Pimephales notatus, Semotilus atromaculatus, Minytrema melanops, Ameiurus melas, Fundulus olivaceus, Gambusia affinis, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. microlophus, Micropterus salmoides, Etheostoma nigripinne, Percina sciera.

102) Morgan County, No Business Creek, ca 1.5 mi E of Danville on Hwy 36 (tributary to Flint Creek), T7S, R5W, Sec 28; 16 June 1984 (UAIC 7839).

Semotilus atromaculatus, Catostomus commersoni, Minytrema melanops, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Etheostoma nigripinne

103) Morgan County, No Business Branch, tributary to Flint Creek, ca. 1.9 mi SSW Danville, T7S, R5W, Sec 32; 11 April 1976 (UAIC 5109).

Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Gambusia affinis, Lepomis cyanellus.

104) Morgan County, Flint Creek, Riggs Bridge 2 mi SW of Hartselle on unnumbered Co. Rd., T7S, R4W, Sec 20W; 25 September 1993 (UAIC 10978).

Cyprinella whipplei, Fundulus notatus, Gambusia affinis, Lepomis macrochirus, L. megalotis, L. microlophus.

105) Morgan County, Crowdabout Creek at unnumbered Co. Rd., 4 mi ESE of Danville, T7S, R5W, Sec 35/36.; 25 September 1993 (UAIC 10975).

Dorosoma cepedianum, Cyprinella whipplei, Pimephales vigilax, Minytrema melanops, Moxostoma erythrurum, Fundulus notatus, Gambusia affinis, Labidesthes sicculus, Lepomis humilis, L. macrochirus, L. megalotis, M. salmoides.

106) Morgan County, Crowdabout Creek on Hopewell Road, unnumbered Co. Rd., 5.5 mi SW of Hartselle, T7S R5W Sec 35; 1 June 1994 (TVA 1004).

Campostoma oligolepis, Cyprinella spiloptera, Pimephales notatus, Ameiurus natalis, A. melas, Fundulus notatus, F. olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides.

107) Morgan County, Herrin Creek 6 mi W of Falkville 0.25 mi E of Massey, upstream from bridge in pasture, T8S, R5W, Sec 12NW; 10 April 1993 (UAIC 10686).

Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Catostomus commersoni, Gambusia affinis, Cottus carolinae, Lepomis megalotis, Micropterus punctulatus, Etheostoma nigripinne.

108) Morgan County, unnamed spring at Al. Hwy 157, trib. to Flint Creek, 1.5 mi N of Battleground (Cullman Co.), T8S R5W Sec 24SE; 7 May 1979 (UAIC 7882).

Etheostoma nigripinne.

109) Morgan County, Crowdabout Creek, tributary to Flint Creek, T8S, R5W, Sec 21; 11 April 1976 (UAIC 5110).

Campostoma oligolepis, Hemitremia flammea, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Catostomus commersoni, Moxostoma erythrurum, Cottus carolinae, Lepomis cyanellus, Etheostoma duryi, E. nigripinne.

110) Morgan County, Dutton Creek, 4.5 mi WSW of Massey, T8S, R5W, Sec 18; 10 April 1993 (UAIC 10689).

Campostoma oligolepis, Hemitremia flammea, Luxilus chrysocephalus, Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Catostomus commersoni, Cottus carolinae, Lepomis cyanellus, L. macrochirus X L. cyanellus, Etheostoma nigripinne.

111a) Morgan County, Mack Creek at Co. Rd. 55, 3 mi W of Falkville, T8S, R4W, Sec 9/4; 16 June 1994 (TVA 1005).

Fundulus notatus, F. olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides.

111b) Morgan County, Mack Creek, 0.5 air mi S of Lebanon Church, at unnumbered Co. Rd., 3.5 air mi WSW of Falkville, T8S, R4W, Sec 8/9; 10 April 1993 (UAIC 10700).

Pimephales notatus, Rhinichthys atratulus, Catostomus commersoni, Minytrema melanops, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, Micropterus salmoides, Etheostoma duryi, E. nigripinne.

112) Morgan County, Unnamed creek, tributary to Flint Creek, ca. 0.4 mi S of Lebanon, T8S, R4W, Sec 8; 11 April 1976 (UAIC 5111).

Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Cottus carolinae, Lepomis cyanellus, Etheostoma duryi, E. nigripinne.

113) Morgan County, Flint Creek at Huckaba Bridge, 3.25 mi SSW of Hartselle, T7S, R4W, Sec 34NW; 11 June 1993 (UAIC 10712), 15 June 1994 (TVA 1001-28).

Dorosoma cepedianum, Cyprinella spiloptera, C. whipplei, Hypentelium nigricans, Minytrema melanops, Moxostoma erythrurum, Fundulus olivaceus, Gambusia affinis, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Pomoxis nigromaculatus, Percina caprodes.

114a) Morgan County, Shoal Creek (downstream of sewage treatment plant) at unnumbered Co. Rd. 2.66 mi S of Hartselle, T7S, R4W, Sec 26/27; 7 June 1994 (TVA 1006-L)

Fundulus olivaceus, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus.

114b) Morgan County, Shoal Creek (upstream of sewage treatment plant) at unnumbered Co. Rd. 2.66 mi S of Hartselle, T7S, R4W, Sec 26/27; 7 June 1994 (TVA 1006-U).

Campostoma oligolepis, Lythrurus fasciolaris, Pimephales notatus, Ameiurus natalis, Fundulus olivaceus, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, Micropterus salmoides, Etheostoma duryi, E. nigripinne.

115) Morgan County, Cedar Creek on Thompson Rd., 0.3 mi E of I-65, 1.3 mi NE of Leesdale, T7S, R3W, Sec 30; 30 June 1984 (UAIC 7840), 2 June 1994 (TVA 1007).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Catostomus commersoni, Hypentelium nigricans, Moxostoma erythrurum, Ameiurus natalis, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides, Pomoxis nigromaculatus, Etheostoma duryi, E. nigripinne.

116) Morgan County, Cedar Creek, tributary to Flint Creek, T7S, R3W, Sec 21; 9 April 1976 (UAIC 5108).

Campostoma oligolepis, Clinostomus funduloides, Phoxinus erythrogaster, Rhinichthys atratulus, Semotilus atromaculatus, Hypentelium nigricans, Cottus carolinae, Lepomis cyanellus, L. macrochirus, Etheostoma caeruleum, E. duryi, E. nigripinne.

117) Morgan County, Flint Creek at Co. Rd. 55, 1.5 mi W of Falkville, T8S, R4W, Sec 2; 15 June 1994 (TVA 1001-32).

Lepisosteus oculatus, Amia calva, Dorosoma cepedianum, Cyprinus carpio, Catostomus commersoni, Minytrema melanops, Moxostoma erythrurum, Gambusia affinis, Labidesthes sicculus, Morone mississippiensis, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides.

118) Morgan County, Flint Creek, 1 mi WSW of Falkville on Co. Rd., T8S, R4W, Sec 11; 26 September 1993 (UAIC 10838).

Fundulus olivaceus, Lepomis macrochirus, L. microlophus, Pomoxis nigromaculatus.

119) Morgan County, Robinson Creek at unnumbered Co. Rd., 1 mi WSW of Falkville, T8S, R4W, Sec 11; 31 May 1994 (TVA 1008).

Campostoma oligolepis, Luxilus chrysocephalus, Pimephales notatus, Semotilus atromaculatus, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma duryi, E. nigripinne.

120) Morgan County, Robinson Creek, tributary to Flint Creek ca. 0.8 mi SE of Falkville, T8S, R3W, Sec 7; 11 April 1976 (UAIC 5112).

Campostoma oligolepis, Lythrurus fasciolaris, Luxilus chrysocephalus, Rhinichthys atratulus, Semotilus atromaculatus, Cottus carolinae, Lepomis cyanellus, Etheostoma duryi, E. nigripinne, Percina sciera.

121) Morgan County, Cole Spring, N side of unnumbered Co. Rd. at intersection, T8S, R3W, Sec 10SW; 15 August 1993 (UAIC 10842).

Rhinichthys atratulus, Semotilus atromaculatus.

122a)Morgan County, Sally Mike Creek private road off unnumbered Co. Rd., 1.5 mi WSW of Lacon, T4W, R8S, Sec 23; 10 June 1994 (TVA 1009).

Cyprinus carpio, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Catostomus commersoni, Minytrema melanops, Ameiurus melas, A. natalis, Esox niger, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. megalotis, L. microlophus, Micropterus salmoides, Perca flavescens

122b)Morgan County, Salley Mike Creek, 1.75 mi WSW of Lacon below Blowing Spring, T8S, R4W, Sec 23; 11 June 1993 (UAIC 10720).

Opsopoeodus emiliae, Pimephales notatus, Cottus carolinae, Lepomis macrochirus, L. megalotis, L. microlophus, Etheostoma duryi.

123) Morgan County, Blowing Spring, 1.75 mi WSW of Lacon on private property, T8S, R4W, Sec 23SW; 11 June 1993 (UAIC 10732)

Cottus carolinae, Lepomis cyanellus.

124) Morgan County, Sevenfalls Creek at gravel rd. 3.5 mi WSW of Lacon, T8S, R4W, Sec 28NE; 11 June 1993 (UAIC 10721).

Lepomis cyanellus.

125) Morgan County, Indian Creek at US Hwy 31, 1.5 mi S of Lacon, T8S, R4W, Sec 25SE; 8 June 1994 (TVA 1010).

Campostoma oligolepis, Cyprinus carpio, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Catostomus commersoni, Ameiurus natalis, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. humilis, L. macrochirus, L. megalotis, L. microlophus, Micropterus punctulatus, M. salmoides, Etheostoma duryi, E. nigripinne.

126) Morgan County, Mill Creek at R.R. crossing off US Hwy 31, 1.4 mi SE of Lacon, T8S, R3W, Sec 30; 8 June 1994 (TVA 1011).

Campostoma oligolepis, Cyprinella spiloptera, C. whipplei, Cyprinus carpio, Luxilus chrysocephalus, Lythrurus fasciolaris, Notropis volucellus, Pimephales notatus, Ameiurus natalis, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus, M. salmoides, Etheostoma duryi.

127) Morgan County, Mill Creek 0.5 mi S of Cole Spring on Co. Rd., T8S, R3W, Sec 15; 26 September 1993 (UAIC 10877).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Catostomus commersoni, Gambusia affinis, Lepomis cyanellus, Etheostoma nigripinne.

128) Cullman County, Rock Creek at Hurricane Creek Park off US Hwy 31, 3 mi NW of South Vinemont, T9S, R3W, Sec 6; 8 June 1994 (TVA 1012).

Campostoma oligolepis, Luxilus chrysocephalus, Pimephales notatus, Semotilus atromaculatus, Hypentelium nigricans, Ameiurus melas, A. nebulosus, Cottus carolinae, Lepomis cyanellus, L. macrochirus, L. megalotis, Micropterus punctulatus, M. salmoides, Etheostoma duryi, E. nigripinne.

129) Cullman County, East Fork of Flint Creek, 2 mi N of Vinemont on Co. Rd., T9S, R3W, Sec 4; 26 September 1993 (UAIC 10595).

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Semotilus atromaculatus, Catostomus commersoni, Hypentelium nigricans, Lepomis cyanellus, L. macrochirus, Micropterus punctulatus, Percina caprodes

130) Cullman County, East Fork of Flint Creek at unnumbered Co. Rd., 1.25 mi WNW of Enon, T8S, R3W, Sec 36; 31 May 1994 (TVA 1013).

Semotilus atromaculatus, Ameiurus nebulosus, Lepomis cyanellus, L. macrochirus, Micropterus salmoides.

131a)Morgan County, Cave Spring, where water flows from under bluff, T6S, R3W, Sec 4; 6 July 1936 (UMMZ TVA 36-23), 27 September 1936 (UMMZ TVA 37-663), 16 April 1938 (UMMZ TVA 38-659), 27 September 1938 (UMMZ TVA 38-663).

Cyprinella spiloptera, Cyprinella whipplei, Hemitremia flammea, Pimephales notatus, Ameiurus melas, Cottus carolinae, Chaenobryttus gulosus, Lepomis cyanellus, L. megalotis, Micropterus salmoides.

131b) Morgan County, Cave Spring Branch, 0.5 mi from Tennessee River, T6S, R3W Sec 4; 6 July 1936 (UMMZ TVA 36-24).

Campostoma oligolepis, Cyprinella whipplei, Macrhybopsis storeriana, Notropis atherinoides, N. buchanani, N. volucellus, Pimephales vigilax, Gambusia affinis.

132) Morgan County, Tennessee River, between mouth of Cave Spring Branch and Martins Creek, T6S, R3W, Sec 3; 6 July 1936 (UMMZ TVA 36-25).

Cyprinella whipplei, Macrhybopsis storeriana, Notropis atherinoides, Pimephales vigilax, Ictalurus punctatus, Micropterus punctulatus, Percina sciera, P. shumardi, Aplodinotus grunniens.

133) Morgan County, Tennessee River, at Sunnyside Landing on S side of Tennessee River opposite Triano, T5S, R2W, Sec 27; 9 July 1936 (UMMZ TVA 36-84).

Dorosoma cepedianum, Cyprinella spiloptera, Hybognathus nuchalis, Notropis buchanani, Moxostoma breviceps, Gambusia affinis, Micropterus punctulatus,

Percina sciera, Stizostedion canadense.

134) Morgan County, McCloskeys Branch at Cane Landing near Tennessee River, T6S, R3W, Sec 1; 2 July 1936 (UMMZ TVA 36-22).

Hybognathus hayi, Ictalurus punctatus, Gambusia affinis, Lepomis macrochirus, L. megalotis.

135) Morgan County, Tennessee River at Bluff City, T6S, R2W, Sec 6; 6 July 1936 (UMMZ TVA 36-26).

Stizostedion canadense.

136) Morgan County, Tennessee River, near mouth of Cotaco Creek, T6S, R2W, Sec 4; 7 July 1936 (UMMZ TVA 36-97), 7 July 1936 (UMMZ TVA 36-98), 8 July 1936 (UMMZ TVA 36-70).

Lepisosteus osseus, Dorosoma cepedianum, Cyprinella spiloptera, C. whipplei, Pimephales vigilax, Moxostoma breviceps, Pylodictis olivaris, Gambusia affinis, Ambloplites rupestris, Lepomis macrochirus, Micropterus dolomieu, M. punctulatus, Percina caprodes, P. sciera, Stizostedion canadense.

137) Morgan County, Cotaco Creek, 2 mi from mouth in Tennessee River, T6S, R2W, Sec 3; 8 July 1936 (UMMZ TVA 36-60).

Dorosoma cepedianum, Luxilus chrysocephalus, Notropis atherinoides, Pimephales notatus, Gambusia affinis, Lepomis macrochirus, Micropterus salmoides, Percina vigil.

138) Morgan County, Valhermosa Spring Creek at Hwy 36 just E of Valhermosa, T6S, R1W, Sec 19; 10 June 1993 (UAIC 10719).

Rhinichthys atratulus, Semotilus atromaculatus, Lepomis cyanellus, Lepomis macrochirus.

139) Morgan County, Town Creek, trib to Cotaco Creek, 3.5 mi E of Somerville on Co. Rd., near Antioch Church, T7S, R2W, Sec 3NW; 14 August 1993 (UAIC 10804).

Ichthyomyzon sp., Cyprinella spiloptera, Cyprinella whipplei, Lythrurus fasciolaris, Minytrema melanops, Fundulus olivaceus, Gambusia affinis, Labidesthes sicculus, Cottus carolinae, Lepomis auritus, L. cyanellus, L. macrochirus, L. megalotis, Etheostoma duryi, Percina caprodes.

140) Morgan County, Town Creek, trib to Cotatco Creek, 0.75 mi S of Sommerville at Gum Spring Creek and Gill Creek off Main St., T7S, R3W, Sec 1; 14 August 1993 (UAIC 10840)

Campostoma oligolepis, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Semotilus atromaculatus, Cottus carolinae, Lepomis auritus, L. cyanellus, L. macrochirus, Etheostoma duryi.

141) Morgan County, Cotaco Creek, 0.75 mi NNE of Lynntown, T7S, R2W, Sec 12; 14 August 1993 (UAIC 10873).

Dorosoma cepedianum, Campostoma oligolepis, Cyprinella whipplei, Opsopoeodus emiliae, Pimephales notatus, Pimephales vigilax, Minytrema melanops, Moxostoma duquesnei, M. erythrurum, Ictalurus punctulatus, Fundulus notatus, F. olivaceus, Gambusia affinis, Labidesthes sicculus, Lepomis auritus, L. cyanellus, L. macrochirus, L. megalotis, L. cyanellus x L. auritus, Micropterus salmoides, M. punctulatus, Etheostoma duryi, Percina sciera, Aplodinotus grunniens.

142) Morgan County, Mud Creek, 0.25 mi upstream in pasture, T8S, R2W, Sec 8; 15 August 1993 (UAIC 10874).

Opsopoeodus emiliae, Pimephales notatus, Moxostoma duquesnei, M. erythrurum, Gambusia affinis, Labidesthes sicculus, Lepomis macrochirus, L. microlophus, Pomoxis annularis.

143) Morgan County, West Fork of Cotaco Creek, 1.75 mi NNW of Gum Pond (Keller Creek) at Ryan Bridge, T8S, R1W, Sec 8NW; 15 August 1993 (UAIC 10878).

Campostoma oligolepis, Cyprinella whipplei, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Catostomus commersoni, Minytrema melanops, Moxostoma erythrurum, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis auritus, L. macrochirus, L. megalotis, L. microlophus, Micropterus salmoides, Etheostoma duryi, E. kennicotti.

144) Morgan County, West Fork of Cotaco Creek, 2.25 mi NNE of Centerdale on jeep trail, T8S, R2W, Sec 11SW; 15 August 1993 (UAIC 10880).

Campostoma oligolepis, Hemitremia flammea, Luxilus chrysocephalus, Lythrurus fasciolaris, Pimephales notatus, Rhinichthys atratulus, Semotilus atromaculatus, Catostomus commersoni, Hypentelium nigricans, Moxostoma erythrurum, Fundulus olivaceus, Cottus carolinae, Lepomis auritus, L. cyanellus, L. macrochirus, L. megalotis, Etheostoma duryi; E. kennicotti.

145) Morgan County, Cotaco Creek at Crawford bridge, unnumbered Co. Rd., T7S, R1W, Sec 29/20; 14 August 1993 (UAIC 10802).

Cyprinella spiloptera, C. whipplei, Opsopoeodus emiliae, Pimephales notatus, Ictalurus punctulatus, Noturus leptacanthus, Pylodictis olivaceus, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, L. macrochirus, Micropterus punctulatus, M. salmoides, Percina caprodes, P. sciera.

146) Morgan County, near Newsome sinks (spring), T7S, R1W, Sec 24NW corner; 16 July 1966 (UAIC 1949).

Rhinichthys atratulus, Catostomus commersoni, Gambusia affinis, Cottus carolinae, Lepomis cyanellus, Etheostoma simoterum, Percina sciera.

147) Morgan County, Cotaco Creek 5.9 air mi N of Hulaco; July 1966 (AUM 4696-4706).

Cyprinus carpio, Hemitremia flammea, Lythrurus fasciolaris, Esox americanus, Fundulus olivaceus, Gambusia affinis, Cottus carolinae, Micropterus salmoides, Etheostoma duryi, E. simoterum, E. nigripinne.

148) Marshall County, Eudy Cave, 2.5 mi SW of Allens Crossroads on Apple Grove Rd., T7S, R1E, Sec 32N; 14 August 1993 (UAIC 10841).

Hemitremia flammea, Lepomis auritus, L. cyanellus,

L. macrochirus, Etheostoma duryi.

149) Marshall County, Mill Pond Creek, unnumbered Co. Rd. at Mill Pond Bridge, 3.75 mi NE of Arab, T8S, R1E, Sec 17; 15 August 1993 (UAIC 10801).

Rhinichthys atratulus, Gambusia affinis, Lepomis cyanellus, L. macrochirus, Micropterus punctulatus.

150) Morgan County, Martins Creek, near mouth in Tennessee River, T6S, R3W, Sec 2; 2 July 1936 (UMMZ TVA 36-99), 2 July 1936 (UMMZ Z115591).

Ictalurus punctatus, Gambusia affinis, Lepomis macrochirus.

151) Morgan County, Tennessee River at Slaughters Landing, T5S, R2W, Sec 24; 8 July 1936 (UMMZ TVA 36-85)

Dorosoma cepedianum, Cyprinella spiloptera, Micropterus punctulatus, Stizostedion canadense, Percina caprodes.

152) Morgan County, Dry Creek, Co. Rd. 1473, first bridge crossing above mouth, T6S, R1W, Sec 3; 10 June 1993 (UAIC 10718).

Campostoma oligolepis, Cyprinella spiloptera, Luxilus chrysocephalus, Pimephales notatus, Gambusia affinis, Cottus carolinae, Chaenobryttus gulosus, Lepomis auritus, L. cyanellus, L. macrochirus, L. megalotis, L. cyanellus x L. macrochirus, Micropterus salmoides, Pomoxis nigromaculatus.

153) Morgan County, Dry Creek, ca 1 mi S of Hwy 36 on Co. Rd. 1.5 mi SW of Lacey Springs, T6S, R1W, Sec 15; 10 June 1993 (UAIC 10717).

Campostoma oligolepis, Pimephales notatus, Semotilus atromaculatus, Fundulus notatus, Gambusia affinis, Cottus carolinae, Lepomis auritus, L. cyanellus, L. macrochirus, L. megalotis, Micropterus salmoides.

William Bartram's Early Observation of a Nest Association Between Cyprinid Fishes

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Interspecific nest associations among fishes, especially those involving cyprinids, have received substantial attention in recent years (e.g., Vives, 1990; Johnston, 1991, 1994a, 1994b; Johnston and Kleiner, 1994;). It may be of historical interest, therefore, to note an 18th century observation of this phenomenon by the prominent American naturalist William Bartram (1739-1823), even though he did not recognize it as such.

Bartram's contributions to North American ichthyology were reviewed by Berra (1989); some of his accounts on fishes of the southeastern United States, including the observation discussed herein, were grouped together by Cruickshank (1961). These accounts were excerpted from Bartram's (1791) report of his collecting trips during the period 1773-1776. The relevant passage is presented by Cruickshank (1961) under the heading, "The Gold Fish (Bartram's Minnow) in a Creek Flowing into Broad River, Georgia":

The waters at this place were still and shoal and flowed over a bed of gravel just beneath a rocky rapid. In this eddy shoal were a number of little gravelly pyramidal hills whose summits rose almost to the surface of the water, very artfully constructed by a species of small crayfish which inhabited them. Here seemed to be their citadel, or place of retreat for their young against the attacks and ravages of their enemy, the gold fish. These, in numerous bands, continually infested them, except at short intervals, when small detachments of veteran crayfish sallied out upon them from their cells within the gravelly pyramids, at which time a brilliant fight presented. The little gold fish instantly fled from every side, darting through the transparent waters like streams of lightning; some even sprang above the surface into the air, but all quickly returned to the charge, surrounding the pyramids as before, on the retreat of the crayfish; in this manner the war seemed to be continual.

[Like Cruickshank (1961), Van Doren (1947) used the phrase "brilliant fight" in the passage just quoted, but Slaughter (1996) used the phrase "brilliant sight."]

What Bartram misinterpreted as the constructions of crayfish were obviously the gravel mound nests of a cyprinid (Maurakis et al., 1991). Although Cruickshank (1961) did not provide an identification of the "gold fish" or "Bartram's minnow" in her glossary, Berra (1989) noted that Bartram wrote about the yellowfin shiner (*Notropis lutipinnis*) from the Broad River, Madison County, Georgia, and Slaughter (1996) equated the "gold-fish" with *N. lutipinnis*. This species is well known as a nest associate of the bluehead chub (*Nocomis leptocephalus*), which builds a pebble mound nest (Maurakis et al., 1992), and the relationship may be obligatory for the shiner (McAuliffe and Bennett, 1981; Wallin, 1989, 1992). Indeed, Bartram's description of his "gold fish," as excerpted below from Cruickshank (1961), may be an amalgamation of observations of the spawning colors of the two species (e.g., Page and Burr, 1991), although it leans more heavily toward the shiner, which would have been by far numerically dominant (Wallin, 1989) and probably in a position of more ready visibility:

The gold fish is about the size of the anchovy, nearly four inches long, of a neat slender form; the head is covered with a salade of an ultramarine blue, the back of a reddish brown, the sides and belly of a flame or of the color of a fine red lead; a narrow dusky line runs along each side, from the gills to the tail; the eyes are large, with the iris like burnished gold.

It should be noted that *Notropis lutipinnis* from the Broad River system have been the target of recent biochemical and morphological analyses (Wood and Mayden, 1992), which suggest that they represent a distinct form closely related to the greenhead shiner (*Notropis chlorocephalus*). The latter species is also a nest associate of the bluehead chub (Johnston, 1991).

What of the crayfish noted by Bartram? They were probably preying on cyprinid eggs. Vives (1990), for example, reported attempts by crayfish to enter the spawning pits on mounds constructed by hornyhead chubs (*Nocomis biguttatus*), and predation is an important element in discussions of the potential costs and benefits to participants in nest associations (Johnston, 1991; Johnston and Page, 1992). Benefits to fishes that nest in pebble mounds may be associated with the positioning of eggs within the interstices among pebbles, where they may be protected from at least some predators and from siltation in a microenvironment that is supplied with a flow of water sufficient to aerate the eggs. Bartram's use of the phrase "cells within the gravelly pyramids" may reflect the porous nature of the mounds he observed.

Johnston (1994a) cited Cope (1869) in support of the claim that nest association has been known for over a hundred years. Like Bartram, however, Cope (1869) misinterpreted his observations of mound nests. He inferred that catostomids had deposited their eggs beneath the piles of stones he observed in the Roanoke River, and he thought that several species of cyprinids gathered at the mounds only to feed on the suckers' eggs.

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The primary purpose of the *Proceedings* is to publish peer-reviewed research papers and critical reviews of activities; regional reports and notes; and other pertinent information pertaining to the biology and conservation of southeastern fishes. The *Proceedings* is also an outlet for range extensions, distributions, and status papers, covering ecology and conservation ichthyology. Life history studies, faunal surveys, management issues, behavior, genetics and taxonomy of southeastern fishes are appropriate topics for papers in the *Proceedings*. Review papers or information on imperiled waters or fishes are particularly appropriate.

Manuscripts should be submitted in duplicate. A good guide for manuscript preparation is the Sixth Edition of the *CBE Style Manual* available form the Council of Biology Editors, One Illinois Center, Suite 200, 111 East Wacker Drive, Chicago, IL 60601-4298.

The entire manuscript including the Abstract (required for longer articles), Introduction, Methods, Results, Discussion, Acknowledgments, Literature Cited, Appendices, Tables, and Figure Legends must be double-spaced. The title, author's name and author's address (including fax number and email address for corresponding author) should be centered on the first page. Indicate a suggested running head of less than ten words at the bottom of the first page. An Abstract (if necessary) will be placed at the beginning of the text. Acknowledgments will be cited in the text immediately before the Literature Cited. All references cited in the paper will follow the standard format of using the last name of the author(s) followed by the year of publication of the paper. In the Literature Cited, the references will be alphabetical by the author's last name and chronological under a single authorship. Literature cited should be standardized and abbreviated, using the *World List of Aquatic Sciences And Fisheries Serial Titles* or guidelines in *CBE Manual for Authors, Editors, and Publishers 6th ed.* for journals not included in the *World List*.

Tables should be typed on a separate page, consecutively numbered and should have a short descriptive heading. Figures (to include maps, graphs, charts, drawings and photographs) should be consecutively numbered and if grouped as one figure each part block lettered in the lower left corner. Computer-generated graphics should be high quality prints; for drawings, high quality prints or photocopies are preferred to the original line art. Legends for figures must be on a separate sheet and each figure must be identified on the back. The desired location of each table or figure should be indicated in the margin of the manuscript. When possible, tables and figures will be reduced to one column width (3.5 in), so lettering on figures should be of appropriate size. Color figures can be printed at the author's expense.

Manuscripts will be subject to editing and will be reviewed by at least two anonymous persons knowledgeable in the subject matter. The edited manuscript and page proofs will be furnished to the author. Upon returning the reviewed and corrected manuscript to the editor, a PC disk copy of the final form of the text, tables and computer-generated graphics is also requested. Specific formatting information for the disk will be sent to the author with the edited manuscript. Reprints can be ordered at the time of printing, and will be supplied to the author at the cost of printing.

Regional reports, news notes and other short communications will also be edited and included when possible in the next number.

Only manuscripts from members of The Southeastern Fishes Council will be considered for publication. There is no charge for publishing in the *Proceedings*. All manuscripts and short communications should be sent to the editor:

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